















Commercial Gardening













HYBRID TEA ROSES

1. Joseph Lowe.      2. Richmond.











# COMMERCIAL GARDENING

A PRACTICAL & SCIENTIFIC TREATISE  
FOR MARKET GARDENERS · MARKET  
GROWERS · FRUIT FLOWER & VEGETABLE  
GROWERS · NURSERYMEN ETC.



*By Many Practical Specialists  
under the Editorship of*

**JOHN WEATHERS**

*Author of "A Practical Guide to Garden Plants"  
"French Market Gardening" "The Bulb Book" &c.*



*In Four Volumes: Fully Illustrated*

**VOLUME IV**

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# CONTENTS

## VOLUME IV

### SECTION XXX.—TREES, SHRUBS, AND WOODY CLIMBERS

	Page
Acer (Maple)—Æsculus—Ailanthus—Alnus—Amelanchier—Amygdalus (Almond)—Andromeda—Aralia chinensis—Arbutus—Aucuba japonica—Azalea—Azara - - - - -	1
Bamboo—Berberidopsis corallina—Berberis (Barberry)—Betula (Birch)—Buddleia—Buxus (Box) - - - - -	7
Calycanthus—Caragana—Carpenteria californica—Carpinus Betulus (Hornbeam)—Carya (Hickory)—Caryopteris Mastacanthus—Cassinia fulvida—Castanea sativa—Castanopsis chrysophylla—Catalpa bignonoides—Ceanothus—Celastrus scandens—Cerasus (Cherry)—Cercis Siliquastrum (Judas Tree)—Chionanthus virginicus (Fringe Tree)—Choisya ternata—Cistus (Rock Rose)—Cladrastis tinctoria—Clematis—Clerodendron—Clethra—Clianthus puniceus (New Zealand Parrot Flower)—Colutea arborescens (Bladder Senna)—Comptonia (Myrica) asplenifolia (Sweet Fern)—Coriaria myrtifolia—Cornus (Cornel, Dogwood)—Coronilla Emerus (Scorpion Senna)—Corylus (Hazel)—Cotoneaster—Cratægus—Cytisus (Broom) - - - - -	10
Dabœcia polifolia (St. Dabeoc's Heath)—Daphne—Daphniphyllum glaucescens—Desfontainea spinosa—Deutzia gracilis—Diervilla (Weigela) - - - - -	19
Elæagnus—Embothrium coccineum (Fire Bush)—Erica (Heath)—Escallonia—Euonymus—Exochorda grandiflora (Pearl Bush) - - - - -	21
Fagus sylvatica (Beech)—Forsythia—Fraxinus excelsior (Ash)—Fuchsia	22
Garrya elliptica—Gaultheria—Genista—Griselinia littoralis - - - - -	23
Halesia—Hamamelis virginica (Witch Hazel)—Hedera Helix (Ivy)—Hedysarum multijugum—Helianthemum (Sun Rose)—Hibiscus syriacus—Hippophae rhamnoides (Sea Buckthorn)—Hydrangea—Hymenanthra crassifolia—Hypericum - - - - -	24



	Page
<i>Idesia polycarpa</i> — <i>Ilex Aquifolium</i> (Holly)— <i>Indigofera Gerardiana</i> -	25
<i>Jasminum</i> — <i>Juglans</i> - - - - -	26
<i>Kalmia</i> — <i>Kerria</i> ( <i>Corchorus</i> ) <i>japonica</i> — <i>Kœlreuteria paniculata</i> - -	27
<i>Laburnum vulgare</i> — <i>Laurus nobilis</i> (Sweet Bay Laurel)— <i>Lavender</i> — <i>Leycesteria formosa</i> — <i>Ligustrum</i> (Privet)— <i>Liquidambar styraciflua</i> (Sweet Gum Tree)— <i>Liriodendron tulipifera</i> (Tulip Tree)— <i>Lonicera</i> (Honeysuckle) - - - - -	27
<i>Magnolia</i> — <i>Morus</i> (Mulberry)— <i>Myrtus communis</i> (Myrtle) - - -	30
<i>Nandina domestica</i> — <i>Neviusia alabamensis</i> — <i>Nuttallia cerasiformis</i> -	31
<i>Olearia</i> — <i>Osmanthus Aquifolium</i> - - - - -	31
<i>Pæonia Moutan</i> (Tree Pæony)— <i>Paliurus aculeatus</i> (Christ's Thorn)— <i>Parrotia persica</i> — <i>Passiflora cœrulea</i> (Passion Flower)— <i>Paulownia</i> <i>imperialis</i> — <i>Periploca græca</i> — <i>Pernettya</i> — <i>Philadelphus</i> (Mock Orange, Seringa)— <i>Phillyrea Vilmoriniana</i> — <i>Phlomis fruticosa</i> (Jerusalem Sage)— <i>Photinia</i> — <i>Pittosporum</i> — <i>Platanus</i> (Plane)— <i>Populus</i> (Poplar)— <i>Prunus</i> (Plum)— <i>Ptelea trifoliata</i> (Hop Tree) — <i>Pyrus</i> - - - - -	31
<i>Quercus</i> (Oak) - - - - -	35
<i>Rhamnus</i> (Buckthorn)— <i>Rhododendron</i> — <i>Rhodotypus kerrioides</i> — <i>Rhus</i> (Sumach)— <i>Ribes</i> (Currant)— <i>Robinia</i> — <i>Rose</i> — <i>Rosmarinus officinalis</i> (Rosemary)— <i>Rubus</i> (Bramble)— <i>Ruscus aculeatus</i> (Butchers' Broom)	36
<i>Salix</i> (Willow)— <i>Sambucus nigra</i> (Elder)— <i>Santolina Chamæcyparissus</i> (Cotton Lavender)— <i>Skimmia</i> — <i>Sophora japonica</i> — <i>Spartium juncum</i> (Spanish Broom)— <i>Spiræa</i> — <i>Staphylea colchica</i> (Bladder Nut)— <i>Symphoricarpos racemosus</i> (Snowberry)— <i>Syringa</i> (Lilac) - -	49
<i>Tamarix</i> — <i>Tecoma</i> ( <i>Bignonia</i> ) <i>radicans</i> — <i>Tilia</i> (Lime) - - -	53
<i>Ulex europæus</i> (Furze, Gorse, Whin)— <i>Ulmus campestris</i> (Elm) - -	54
<i>Vaccinium</i> — <i>Veronica</i> — <i>Viburnum</i> — <i>Vinca</i> (Periwinkle)— <i>Viscum album</i> (Mistletoe)— <i>Vitex Agnus-Castus</i> — <i>Vitis</i> - - - - -	54
<i>Wistaria</i> - - - - -	57
<i>Xanthoceras sorbifolia</i> - - - - -	58
<i>Yucca gloriosa</i> - - - - -	58

## SECTION XXXI.—CONIFERS AND TAXADS

<i>Abies</i> (Silver Fir)— <i>Araucaria imbricata</i> (Monkey-puzzle Tree)— <i>Cedrus</i> (Cedar)— <i>Cephalotaxus</i> — <i>Cryptomeria japonica</i> — <i>Cunninghamia</i> <i>sinensis</i> — <i>Cupressus</i> (Cypress)— <i>Ginkgo biloba</i> — <i>Juniperus</i> — <i>Larix</i> <i>europæa</i> (Common Larch)— <i>Libocedrus decurrens</i> — <i>Picea</i> (Spruce Fir)— <i>Pinus</i> — <i>Podocarpus andina</i> — <i>Pseudotsuga Douglasi</i> (Douglas Fir)— <i>Retinospora</i> — <i>Saxegothea conspicua</i> (Prince Albert's Yew)—
---



	Page
Sciadopitys verticillata (Umbrella or Parasol Pine)—Sequoia gigantea —Taxodium distichum (Deciduous or Bald Cypress)—Taxus baccata (Yew)—Thuja (Arbor Vitæ)—Torreya—Tsuga - - - -	59

## SECTION XXXII.—VEGETABLE GROWING FOR MARKET

§ 1. GENERAL CONSIDERATIONS—Soil—Water—Markets, Carriage, &c.—Horse versus Motor—Gluts—Rent—Deep Culture— Manure—Natural Groups - - - - -	66
§ 2. ARTICHOKE—The Jerusalem Artichoke—The Globe Artichoke —Chinese Artichoke - - - - -	72
§ 3. ASPARAGUS—Introductory—Raising the Plants, &c.—Planting —Cutting—Grading and Marketing—Winter Treatment— Forcing—Pests - - - - -	75
§ 4. BEANS—The Broad Bean—The Runner Bean—The French or Kidney Bean—French Climbing Beans - - - - -	81
§ 5. BEETROOT - - - - -	85
§ 6. BORECOLE OR KALE - - - - -	86
§ 7. BROCCOLI - - - - -	87
§ 8. BRUSSELS SPROUTS - - - - -	88
§ 9. CABBAGES—Introductory—Spring Cabbages—Spring Sowing— Red Cabbage—Cabbages under Glass—Savoy Cabbage -	89
§ 10. CARROTS - - - - -	94
§ 11. CAULIFLOWERS - - - - -	96
§ 12. CELERY—Ordinary Celery—Celeriac or Turnip-rooted Celery —Pests - - - - -	98
§ 13. CUCUMBERS—General—Temperature—Soil—Sowing the Seeds —Planting—Topdressing—Stopping—Tying—Syringing— Shading—Cutting and Grading—Packing—Varieties— Profits—Ridge Cucumbers—Insect Pests of Cucumbers— Fungoid Diseases - - - - -	101
§ 14. ENDIVE - - - - -	109
§ 15. INDIAN CORN OR MAIZE - - - - -	110
§ 16. KOHL-RABI - - - - -	111
§ 17. LEEKS - - - - -	112
§ 18. LETTUCES—General—Spring Lettuce—Tying - - - - -	113
§ 19. MINT—General—Forcing - - - - -	116
§ 20. MUSHROOMS—Introductory—Preparation—Indoor Mushroom Beds—Spawning the Mushroom Beds—Casing the Beds —Picking—Outdoor Ridge Beds—Cost of Production— Diseases, &c. - - - - -	117



	Page
§ 21. ONIONS—General—Market Culture—Spring Onions—Diseases and Pests - - - - -	124
§ 22. PARSLEY - - - - -	128
§ 23. PARSNIPS - - - - -	129
§ 24. PEAS - - - - -	130
§ 25. POTATOES—Introductory—Cultivation of the Potato—The Soil—Manure—The Great Manurial Mistake—Sprouting Potatoes—Does it Pay to Sprout?—Size of Seed Potatoes—Planting Potatoes—Distance between the Rows—Overcrowding and “Chats”—“Cut” versus “Whole” Sets—Earthing up and Sunshine—Cost of Cultivation, Profits, &c.—Potato Diseases—The Common Potato Disease, or Potato Blight—Potato-leaf Curl—Potato Scab—Black Scab or Warty Disease—Winter Rot—Insect Enemies—Kinds of Potatoes to Grow - - - - -	131
§ 26. RADISHES—General—Radishes under Glass - - - - -	155
§ 27. RHUBARB—General—Forcing Rhubarb - - - - -	158
§ 28. SEAKALE—General—Forced Seakale—Natural Seakale - - - - -	160
§ 29. SHALLOT - - - - -	162
§ 30. SPINACH—General—The New Zealand Spinach - - - - -	163
§ 31. TOMATOES—Introductory—Tomatoes in the Channel Islands—Cultivation—Sowing the Seed—Potting—Final Planting or Potting—Training—Watering—Defoliating—Ventilation—Manures—Winter Crops—Outdoor Tomatoes—Packing Tomatoes for Market—Saving Tomato Seed—Diseases and Pests—Eelworms—Wireworms—Fungoid Diseases of Tomatoes—The Leaf Spot or Yellow Spot—Black Stripe or Black Rot—The Sleepy Disease of Tomatoes—Black Blotch—Market Varieties of Tomato - - - - -	164
§ 32. TURNIPS - - - - -	181
§ 33. VEGETABLE MARROW - - - - -	184

#### SECTION XXXIII.—SWEET HERBS AND SMALL SALADS

Angelica—Balm—Basil, Sweet—Borage—Burnet—Camomile—Caper Bush—Capsicum—Caraway—Cardoon—Chervil—Chicory—Chives—Clary—Coriander—Corn Salad or Lamb's Lettuce—Cress—Dandelion—Dill—Egg Plants or Aubergines—Fennel—Garlic—Good King Henry—Horehound—Horse-radish—Hyssop—Liquorice—Marigold—Marjoram—Mint or Spearmint—Mustard—Nasturtium or Indian Cress—Orache or Mountain Spinach—Purslane—Rampion—Rue—Sage—Salsafy or Vegetable Oyster—Savory—Scorzonera—Sorrel—Southernwood—Tansy—Tarragon—Thyme—Watercress—Wood Sorrel—Wormwood - - - - -	186
--	-----



## SECTION XXXIV.—FRENCH GARDENING OR INTENSIVE CULTIVATION

	Page
§ 1. GENERAL—General—Site and Aspect—Requisites for a French Garden—Making the Beds—Frames—Lights—Cloches or Bell Glasses—Water—Mats—Miscellaneous—Expenses and Receipts of a “French Garden” of Two Acres - - -	203
§ 2. CROPS GROWN IN FRENCH GARDENS—Carrots—Cauliflowers—Celery—Corn Salad or Lamb’s Lettuce—Cucumbers—Endive—Lettuces—Melons—Radishes—Spinach—Turnips - - -	214
INDEX - - - - -	227







# LIST OF PLATES

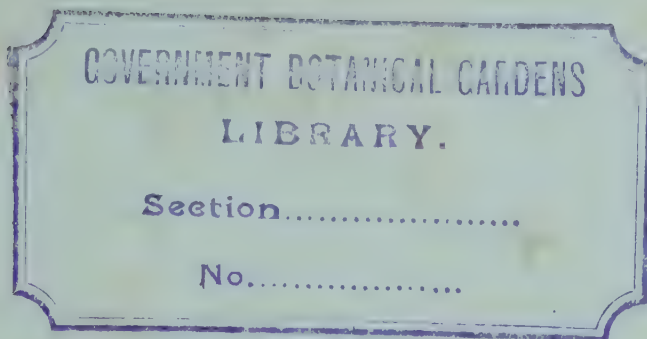
## VOLUME IV

HYBRID TEA ROSES ( <i>in colour</i> ) - - - - -	<i>Frontispiece</i>	Page
1. Joseph Lowe.	2. Richmond.	
SOME MARKET DAFFODILS ( <i>in colour</i> ) - - - - -		24
1. Horsfieldi.	2. Sir Watkin.	
3. Emperor.	4. Maximus.	
A FEW GOOD MARKET PLUMS ( <i>in colour</i> ) - - - - -		50
1. Gisborne.	2. Orleans.	3. Tzar.
4. Victoria.	5. Greengage.	
ASPARAGUS BEING SOLD AT SMITHFIELD MARKET, EVESHAM; RUNNER BEANS PACKED IN BAGS FOR MARKET - - - - -		76
CELERY BEING SOLD IN COVENT GARDEN MARKET; BRUSSELS SPROUTS AS SENT TO MARKET - - - - -		88
PACKING "EARLY MONARCH" CABBAGES AT MR. J. W. CROSS'S FARM, WISBECH - - - - -		92
CAULIFLOWERS AND CABBAGES FOR COVENT GARDEN MARKET; SORT- ING CAULIFLOWERS INTO "FIRSTS" AND "SECONDS" - - - - -		96
A CUCUMBER HOUSE IN MESSRS. T. ROCHFORD AND SON'S NURSERY AT BROXBOURNE, HERTS - - - - -		104
MUSHROOM BED AT ISLEWORTH; A CUCUMBER HOUSE - - - - -		118
SOME FAMILIAR VEGETABLES ( <i>in colour</i> ) - - - - -		136
RADISHES AT COVENT GARDEN MARKET; RHUBARB, ONIONS, AND BAGS OF CARROTS AT COVENT GARDEN MARKET - - - - -		156
TURNIPS FOR STREET SALE; FORCED RHUBARB FOR MARKET - - - - -		182



WATERCRESS BEDS IN BERKSHIRE	- - - - -	Page 200
DEMONSTRATION OF FRENCH GARDENING; VIEW IN THE BURHILL FRENCH GARDEN, WALTON-ON-THAMES	- - - - -	206
CLOCHES STACKED DURING SUMMER IN A FRENCH GARDEN; PLANTING TOMATOES AFTER EARLY POTATOES UNDER GLASS IN JERSEY	-	210
A LECTURE ON FRENCH GARDENING; CANTELOUPE MELONS IN FRAMES AT THATCHAM	- - - - -	222





## SECTION XXX

# Trees, Shrubs, and Woody Climbers

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Although results are not so quickly attainable with trees and shrubs as in some branches of nursery or market-garden work, yet once stocks are secured and a supply maintained by a properly organized scheme of propagation, there should be no difficulty in finding a market. The development of garden cities and suburbs, the increasing practice of planting trees in streets, and the growing desire shown by owners of gardens and pleasure grounds, small and great, to utilize either flowering or foliage trees and shrubs, are all indications of a demand that has to be met.

The scope and extent of operations by the would-be nurseryman will naturally be largely determined by the amount of land available and its situation. A site in the south of England, or on the coast, for instance, will enable many subjects to be propagated and grown out-of-doors throughout the year, whilst similar plants in a nursery farther north may require a glasshouse for propagating and protection during the winter. On the other hand, stock from northern parts has the reputation of greater hardihood than that grown farther south.

The best soil for a tree and shrub nursery is undoubtedly a good deep loam, somewhat inclined to a sandy nature rather than too stiff. Clay should be avoided. If a portion of the land is of a peaty nature, so much the better; it will serve excellently for what are termed "American" plants. At one time it was considered essential that peat should be present in the soil to grow Rhododendrons with success. This is not so; they thrive splendidly in loam without a trace of peat, and, what is of great importance to the nurseryman, they transplant successfully from loam to the ordinary soil of the average garden. This is more than can be said of those grown on peat. An open situation is preferable, and low-lying ground should, as a rule, be avoided.

A glasshouse—one or more—fitted with propagating cases and heated with hot-water pipes should be available. Frames for inserting cuttings and hardening off young stock from the propagating house will also be required. It is also advisable, indeed essential in the colder parts of the country, to set aside a portion of the most protected part of the nursery



and divide it into sections by planting shelter hedges. Beech is excellent for this purpose, though, owing to its somewhat slow growth, the green oval-leaved Privet is frequently used instead. In these sections there should be planted the more tender subjects as they come from the frames. As they develop they should be transplanted to the more open part of the nursery, their place being taken by further batches of young "growing-on" stock.

A word as to transplanting in general. To ensure safe removal from the nursery to the customer's garden the tree or shrub must possess a good supply of fibrous roots. These can only be produced by regular transplanting in the nursery. No definite or fixed line can be laid down as to how frequent this should be, as much depends on the soil, the character of the plant, &c. Whilst very frequent transplanting would develop numerous roots, it would at the same time have a retarding effect on the growth. Experience will teach as to how often it is advisable to transplant; the point to bear in mind is, that it should not be neglected or overlooked.

Another point that requires attention is the method of cultivating trees for street and avenue planting. Too frequently they are grown in blocks—row after row, side by side. This is a mistake. Unless a tree has space, air, and light it cannot be expected to attain its proper development. The better way is to plant in single rows, these being, say, 15 or 20 yd. apart. The intervening ground may be occupied by dwarf-growing shrubs.

Seeds require to be sown under glass or outside according to their hardiness or otherwise. Spring is usually the best time to sow. Outdoor grafting is usually done in March, and budding in July, when the sap is in full flow and the bark lifts readily for the ripened buds. Cuttings for outside are usually made and planted during the autumn, using well-ripened wood. Plants such as Privet, Poplars, Ribes, Weigela, Willows, and deciduous subjects in general should have the cuttings made at least 6 in. in length, firmly planted closely together in rows, not more than 1 in. of the top part of the cutting being above ground when planting is completed. Cuttings inserted in pots, boxes, or pans indoors are usually of a softer growth than one would plant outside, consequently they may be inserted at various periods during the growing season.

Layering is practised with many shrubs that are of dwarf growth. Some of the more common sorts of Rhododendrons are propagated in the same way.

Where grafting indoors is referred to, it must be understood to have reference to stocks that have already been established in pots, and may be carried out during autumn, winter, and spring. As a rule it is unnecessary to use wax for indoor grafting, though it is essential out-of-doors.

**Acer** (MAPLE).—A large trade is done in some kinds of Maple, of which the best-known kinds, perhaps, are the Common Sycamore (*A. Pseudoplatanus*) and the Norway Maple (*A. platanoides*). Of the Sycamore



more there are several varieties, such as *albo-variegatum*, white and green; *flavo-marginatum*, yellow edged; *atro-purpureum*, purplish; *Leopoldi*, silvery; the Corstorphine Maple (*lutescens*), golden leaved; *Prinz Handjery*, *Webbianum*, *Simon Louis*, *Worlei*, and others. One of the most popular forms of the Norway Maple is *Schwedleri*, with bronzy-red leaves, but there are others, like *Reitenbachi*, *aureo-variegatum*, *laciniatum*, *purpureum rubrum*, &c. The Common English Maple (*A. campestre*) also has several varieties, including a variegated one, but is not so extensively grown in nurseries. The common forms of the above are raised from seeds, but the varieties are usually budded.

The Japanese Maples are now largely grown for the decoration of parks and large gardens, and are to be had in many varieties. These are chiefly derived from *A. japonicum* (fig. 408) and *A. palmatum*. The best-known varieties of *japonicum* are *aureum*, *compactum*, *laciniatum*, *rufinerve albo-lineatum*. The *palmatum* section is more diverse, and consists of the *dissectum* and *septemlobum* groups—both charming, and remarkable for the numerous dissections of the leaves and the brilliancy of their tints. The choicer varieties are usually grafted on stocks of the common forms, and these are raised from seeds. The green-leaved Box Elder (*A. Negundo* or *Negundo fraxinifolium*) is a very useful plant, but chiefly serves as a stock upon which the variegated silver and golden forms are budded.



Fig. 408.—*Acer japonicum*

Of late years attention has been given to other species of Maple, notably *dasycarpum*, a fine Japanese species with several varieties; *rubrum*, the Canadian scarlet-leaved Maple; *saccharinum*, the North American Bird's Eye or Sugar Maple; and *tataricum* or *cordifolium*, with a fine coloured variety called *Ginnala*.

**Æsculus.**—With the genus *Pavia* this includes the Horse-chestnut (*Æ. Hippocastanum*) and the Buck Eye. There are several fine varieties of the Horse-chestnut, including the double white-flowered one and the variegated silver and golden forms. The Red-flowered Buck Eye (*rubra*) is a fine plant, as is also the white-flowered (*macrostachya*). Other good species are *californica* (fig. 409), white or pale rose; *carnea* (or



*rubicunda*), scarlet, with a fine variety called *Brioti*; *chinensis*, creamy white; *flava*, yellow, with a purple-tinted variety; *glabra*, greenish yellow: *indica*, red and yellow. The common varieties are all raised from seeds, but specially good coloured forms are generally budded or grafted on stocks of the common Horse-chestnut.



Fig. 409.—*Aesculus californica*. (S.)

*perialis* or *asplenifolia*, also deeply cut leaves; *incisa* or *oxyacanthifolia*, with Hawthorn-like leaves; and *quercifolia*, with leaves lobed like those of the Common Oak. Other Alders are the Grey, White, or Hoary, *incana*; and the Green one, *viridis*; to which may be added *nitida*, a fine Himalayan tree, with leaves 5–6 in. long.

**Amelanchier.**—The best-known kind is *canadensis*, a lovely North American tree, with oblong elliptic pointed leaves which assume deep-red and brown tints in autumn. It bears masses of snowy-white Hawthorn-like flowers in April. The fruits are purple crimson. There are several varieties, such as *florida* or *alnifolia* (fig. 410), *ovalis*, *rotundifolia*, *sanguinea*, &c. The ordinary form is raised from seeds, but the varieties are grafted on the Hawthorn. *A. vulgaris* is a European shrub, with roundish oval leaves, white flowers, and deep-purple fruits.



Fig. 410.—*Amelanchier florida* (*alnifolia*). (S.)



**Amygdalus** (ALMOND).—The Common Almond (*A. communis* or *Prunus Amygdalus*) sells well as a standard ornamental tree for flowering in February and March. Besides the ordinary white or rose kind there are several varieties, such as *amara*, the Bitter Almond; *dulcis*, the Sweet Almond; *macrocarpa*, and the double-flowered one (*flore pleno*)—all worth stocking. All kinds are usually propagated by budding on Plum stocks; but they may also be increased by grafting and layering. See articles on “*Cerasus*” and “*Prunus*”.

Other Almonds not so well known are *nana*, a native of South Russia, 2–4 ft. high, with rose-pink flowers in February, March, and April. There are several forms of it. The Silver Almond, *orientalis*, from Asia Minor, is a more tender species, with a silvery down on the leaves.

**Andromeda**.—Botanists have decided for the time being that there is only one species, namely the British *polifolia*, a dwarf evergreen shrub about 1 ft. high, found wild in British and Irish peat bogs. It has pinky-white drooping flowers tipped with red from May to August. There are several varieties, such as *rosmarinifolia*, *canadensis*, *rubra*, *angustifolia*, &c. Propagation is by seeds or layers. Other plants known to nurserymen and gardeners under the name of Andromeda are *Pieris floribunda*, 2–6 ft., with pure-white flowers in April and May; *P. japonica*, 3 ft., white, with the varieties *elegantissima* and *variegata*. The plants also now known under the names of *Lyonia*, *Cassandra*, *Leucothoë*, and *Oxydendron* are still referred to as Andromedas by many in the trade. The lovely pure-white *Zenobia speciosa*, and its variety *pulverulenta*, was formerly known as *Andromeda dealbata*, owing to the whitish under surface of the leaves.



Fig. 411.—*Aralia chinensis*

**Aralia chinensis** (*Dimorphanthus mandschuricus*).—A somewhat prickly and hairy ornamental Chinese shrub (fig. 411), having leathery twice-pinnate leaves, and panicles of creamy-white flowers, succeeded by black berries. The variegated form with an irregular silvery bordering to the leaflets is particularly handsome. It is generally grafted on the green-leaved form, which is itself raised from seeds, or cuttings of the stems and roots. Other shrubby species are the North American Angelica Tree, *spinosa*, 8–12 ft., with thrice-pinnate leaves, and *A. Maximowiczii* (or *Acanthopanax ricinifolium*), an elegant Japanese shrub with prickly stems and leaves lobed like those of the Castor-oil plant (*Ricinus*). The Chinese Ricepaper Tree (*A. papyrifera*), belongs to this group, but is now known under the name of *Fatsia*. *A. Sieboldii* is dealt with in Vol. II, p. 127.



**Arbutus.**—The best-known species is *A. Unedo*, the British Strawberry Tree, with evergreen finely toothed leaves, clusters of drooping white or rose-tinted flowers in autumn, followed by roundish granular Strawberry-like fruits. There are varieties like *coccinea*, *rubra*, *microphylla*, and *Croomei*, which are either grafted on stocks of the common species or layered. The Grecian *A. Andrachne*, 10–15 ft. high, has greenish-white flowers in March and April; and *A. Menziesi* (*procera*) from North America has Laurel-like leaves, and white flowers in September. There is a hybrid group supposed to have originated between *Unedo* and *Andrachne*, and there are several varieties like *magnifica*, *photiniæfolia*, *Milleri*, *Rollisoni*, and *serratifolia* with a flowering period between December and February.

**Aucuba japonica.**—There are male or pollen-bearing and female or berry-bearing plants of this species. The male kind was introduced from Japan by Robert Fortune in 1850, but the female was introduced as early as 1783. There are now many varieties, differing chiefly in the mottling and variegation of the leaves—some having wholly green foliage. By raising the plants from seeds still further variations are possible. A great trade is done in Aucubas, and thousands are sold annually in all stages of growth, from 9 in. to 3 ft. high, from the open, and also in pots. Female plants are largely grown in 5-in. pots for winter decoration. When in bloom they are hand fertilized with pollen collected from the male plants. In this way a good crop of crimson berries are secured; but there is a yellow-fruited variety called *luteocarpa*. The plants are usually grown under glass for this purpose. Propagation is chiefly by cuttings in the open air, or in frames. Large pieces inserted in a hotbed of coconut fibre or leaf mould root readily, and in this way bushy plants are now quickly secured. Layering in the open air is also adopted, and seeds should be sown in warmth.

**Azalea.**—Besides the more tender Indian Azaleas (see Vol. II, p. 130) there are several hardy species and varieties. The natural species are practically confined to botanical collections, and include *arborescens*, 10–20 ft., deciduous, reddish flowers; *calendulacea*, 2–6 ft., deciduous, yellow, red and orange; *amæna*, 1–3 ft., rich crimson, a magnificent evergreen quite hardy in the London area; *mollis* (or *sinensis*), 3–4 ft., deciduous, orange red, and yellow, with almost innumerable forms with a great range of yellow, orange, salmon, rose, and intermediate shades of colour; one of the most popular forms being Anthony Koster; *nudiflora*, 3–4 ft., deciduous, pink or purple; *occidentalis*, from California, produces its white sweet-scented flowers in June and July; *pontica* (*flava*), pale yellow; *rhombica*, bright rose purple; *Schlippenbachii*, bright rose; *Vaseyi*, pale rose to white; and *viscosa*, white.

The Ghent, American, or Honeysuckle Azaleas have originated from *nudiflora*, *calendulacea*, and *occidentalis*, and are remarkable for their fragrance and hardiness, and for their brilliant colouring from May to July. There are numerous single- and double-flowered varieties, all easily



grown in a compost of peat, loam, and leaf soil. Hybridizing operations between the best forms of the Ghent Azaleas, and *A. mollis*, have resulted in other lovely garden forms.

**Azara.**—The kind most generally grown is *microphylla*, a somewhat tender Chilian evergreen shrub with dark shining green leaves, small greenish fragrant flowers, succeeded in favourable spots by orange berries. Usually grown in pots for sale. Other kinds are *dentata*, *Gilliesi*, both with coarsely toothed leaves, and *integrifolia*, with entire leaves. Increased by cuttings of the ripened shoots inserted in sandy soil under glass.

**Bamboo.**—There are about fifty different kinds of Hardy Bamboos grown, and these are split up under three genera as follows.

1. ARUNDINARIA: *anceps*, *aristata*, *auricomma*, *chrysantha*, *falcata*, *Falconeri*, *Fortunei*, *Hindsii*, *humilis*, *japonica*, *Laydekeri*, *macrosperma*, *Nagashima*, *nitida*, *nobilis*, *palmata*, *pumila*, *pygmaea*, *racemosa*, *Simoni* (fig. 412), *spathiflora*, and *Veitchii*.

2. BAMBUSA: *angustifolia*, *disticha*, *marmorea*, *quadrangularis*, and *tessellata*.

3. PHYLLOSTACHYS: *aurea*, *Castillonis*, *fastuosa*, *flexuosa*, *fulva*, *Henonis*, *heterocycla*, *Marliacea*, *mitis*, *nigra* (fig. 413), *nigro-punctata*, *Quilloi*, *ruscifolia*, *sulphurea*, *violescens*, and *viridi-glaucescens*. The Phyllostachys group are as a rule readily distinguished from the others



Fig. 412.—*Arundinaria Simoni*



Fig. 413.—*Phyllostachys nigra*



by having the stems alternately rounded and flattened between the joints.

For all practical purposes all the above are generally called Bamboos, and even botanists differ as to the placing of certain species among the three genera mentioned. Perhaps the most common kinds are *A. japonica* or *Bambusa Metake*, and *Phyllostachys Henonis*—but all are beautiful and graceful in appearance. For full details as to characters of each species the reader is advised to consult the *Practical Guide to Garden Plants* (Longmans), pp. 964 to 971. Hardy Bamboos are easily grown in a

loamy soil, enriched with well-decayed manure and topdressed annually. They should be sheltered from bleak northerly and easterly winds in spring. The best time to transplant or divide is late in April or in May, and not in autumn or winter which are the worst periods. Plants for sale are usually grown in pots, and prices vary according to the law of supply and demand.



Fig. 414.—*Berberidopsis corallina*

**Berberidopsis corallina.**—An ornamental Chilean shrub with rambling stems, spiny *Berberis*-like leaves, and drooping racemes of crimson flowers. Fairly hardy round London. Raised from seeds, cuttings of the young shoots in sandy soil, and by layers (fig. 414).

**Berberis** (BARBERRY).—The species most largely grown is the North American Holly-leaved Bar-

berry, *B. Aquifolium* (formerly known as *Mahonia*). It is a graceful plant with pinnate spiny-toothed leaves, and produces masses of yellow flowers in March and April, and later on deep-purple fruits like miniature plums, excellent for jam. Thousands are grown for sale annually and are propagated by seeds, division, and cuttings. The plants are excellent for game coverts, and the foliage, either natural or dyed, is largely used by florists for decorative work.

Darwin's Barberry (*B. Darwini*), from Patagonia, is another splendid evergreen with arching sprays of small spiny leaves, and orange flowers; and with it may be classed *stenophylla* (a hybrid between *Darwini* and *empetrifolia*) an excellent plant for covert work, &c. *B. japonica*, *B. nepalensis*, *B. Thunbergi*, and *B. Wallichiana*, are other good kinds, but there are several others not so well known. The common Barberry of our copses and hedges (*B. vulgaris*) is a deciduous species with about



fifty different varieties, one of which (*atropurpurea*) has rich purple-red leaves. When in fruit in autumn all varieties of *B. vulgaris* are handsome, especially one called *asperma*, which has drooping clusters of scarlet oblong berries. Special varieties are usually raised from layers. *B. aristata* (fig. 415), from North India, resembles the common species, but has large blue-green berries.



Fig. 415.—*Berberis aristata*. ( $\frac{1}{2}$ .)

**Betula (BIRCH).**—There are many species of Birch, but perhaps none to equal in beauty and value the common silver or white-barked Birch of the British Islands (*B. alba*), which attains a height of 50–80 ft. in favoured localities. Young plants from 1½–7 ft. high are sold in thousands every year either for home or foreign plantations. There are several varieties, including *albo-purpurea*, the leaves of which are rich purple above, white beneath; *laciniata*, leaves deeply cut; *pendula Youngi*, the Weeping Birch; *variegata*, leaves blotched with white, and others. The North American Paper Birch (*B. papyracea*) grows 60–70 ft. high, and also has a white bark.

**Buddleia.**—Ornamental shrubs, of which the best known are: the Chilian Orange Ball Tree (*B. globosa*), 10–20 ft. high, with long lance-shaped leaves, and ball-like heads of brilliant orange-yellow flowers. *B. variabilis*, from Tibet, grows 6–8 ft. high, has long tapering racemes of lilac or rose-purple flowers from June to September. The variety *Veitchiana* is somewhat deeper tinted in colour. Both these species are quite hardy in most parts, and may be raised from seeds or cuttings. *B. Colvillei* is only hardy in the very mildest parts of the kingdom, although it comes from 9000 to 12,000 ft. up the Himalayas. It has beautiful bell-shaped rosy flowers, and is probably best as a pot plant grown in a greenhouse. Other species rarely seen are *crispa*, *japonica*, and *Lindleyana*.

**Buxus (Box).**—The Common British Box (*B. sempervirens*) is the best for commercial purposes. It is extensively grown for hedges, coverts, &c., and, owing to the fact that it stands clipping well, is now grown in a variety of fantastic shapes for topiary work in large pots, tubs, or boxes (see Vol. I, p. 13). There are many varieties, that known as *suffruticosa* being largely used for edging purposes. Others, like *angustifolia*, *myrtifolia*, *rosmarinifolia*, *latifolia*, have peculiarities of foliage indicated by the names. There is a pretty golden-leaved form called *aurea*, a silvery one, *argentea*, one called *marginata* edged with yellow



or cream, a broad-leaved one called *Handsworthiana*, and a drooping variegated form, as well as a variable Japanese variety called *japonica*. With the exception of *suffruticosa*, which is increased by division in spring, all other kinds of Box are propagated by cuttings inserted in sandy soil in cold frames. The Minorca Box (*B. balearica*), which is said to attain a height of 80 ft. in the Mediterranean region, has oblong elliptic leaves about 2 in. long, and is comparatively quick growing. It is raised from cuttings and layers.

**Calycanthus.**—The Carolina Allspice (*C. floridus*), 6–8 ft., with dull-purple flowers, sells on account of its camphor-like scent. Among its varieties are *asplenifolius*, with cut leaves, *bullatus*, wrinkled, and *variegatus*. *C. occidentalis*, the “Sweet-scented Shrub” of California, is known



Fig. 416.—*Chimonanthus fragrans*

also as *macrophyllus*. It has large ovate heart-shaped leaves and brick-red flowers. Other species are *glaucus* (*fertilis*) and *laevigatus*. The slender branching shrub formerly known as *C. præcox* is now known as *Chimonanthus fragrans*, and, owing to the fact that it produces its sweet-scented yellow flowers with a purple centre from December till March, it is popularly known as the “Winter Sweet” (fig. 416). The variety *grandiflorus* has larger flowers. The plant requires shelter from cold bleak winds.

**Caragana.**—The best-known species is the Siberian Pea Tree (*C. arborescens*), which grows up to 20 ft. high, having pinnate leaves, and clusters of yellow pea-like flowers in April and May. Other kinds not so largely grown for sale are *aurantiaca*, 3–4 ft.; *Chamlagu*, *frutescens*, *jubata*, *microphylla* or *Altagana*, *pygmæa*, and *spinosa*. Caraganas are suitable for shrubberies or game coverts, and may be raised from seeds or layers, but most kinds are grafted on stocks of *C. arborescens*.

**Carpenteria californica.**—A lovely North American shrub, 6–10 ft. high, with broadly lance-shaped leaves, 2 to 3 in. long, and trusses of pure-white Anemone-like flowers in June. It is a tender plant, and is grown for sale in pots about 2s. 6d. to 3s. 6d. each. Fairly hardy in the mildest parts. Raised chiefly by layers, but also from seeds.

**Carpinus Betulus** (HORNBEAM).—This British tree grows from 30–70 ft. high, and is recognized by its doubly serrate ovate elliptic leaves, hairy beneath. Plants from 1½–3 ft. high are sold for hedge purposes, chiefly at the rate of 2s. to 3s. per 100. There are several varieties, including *aureo-variegata*, leaves blotched yellow; *incisa*, leaves cut; *quercifolia*, Oak-like, and *variegata*, variegated, blotched with white. The American Hornbeam (*americana* or *caroliniana*) has ovate oblong pointed leaves serrated doubly on the margin. Raised from seeds.

**Carya** (HICKORY).—The Hickories are fine deciduous North American trees, 30–70 ft. high, with Walnut-like leaves. They are easily raised from seeds, best sown in small pots for sale, as taproots make transplanting difficult. The wood is of great value for many purposes, and the trees themselves are highly ornamental. The best-known kinds are *alba*, *amara*, *microcarpa*, *olivæformis*, *porcina*, and *tomentosa*.

**Caryopteris** *Mastacanthus*.—A pretty Chinese bush, with purplish stems, ovate-oblong coarsely toothed leaves, and clustered deep-violet or lavender flowers in October. Hardy in the milder parts of the kingdom. Raised from seeds, cuttings, and suckers.

**Cassinia** *fulvida* (*Diplopappus chrysophyllus*).—Although called the “Golden Heath”, this New Zealand shrub belongs to the Daisy family. It grows 2–3 ft. high, and has yellowish wiry stems and narrow leaves deep green above, golden beneath. It is a useful covert plant, and may be readily increased by cuttings in autumn or by seeds. Other species are *leptophylla* and *Vauvilliersi*.

**Castanea** *sativa* (*Vesca vulgaris*).—This is the Sweet Chestnut, 50–70 ft. high, native of Asia Minor, but now practically naturalized. It is a splendid ornamental tree, useful for fruit and timber, with large deep-green serrate leaves. There are several varieties, the best being *aureo-marginata*, in which the leaves are variegated with yellow. Young plants 1–7 ft. high sell well, and are raised from seed. Special varieties are grafted or budded.

**Castanopsis** *chrysophylla*, from North America, is closely related to the Sweet Chestnut, and is recognized by the yellowish under surface of deep-green ovate lance-shaped leaves.

**Catalpa** *bignonioides* (*C. syringæfolia*).—A noble North American tree, known as the “Indian Bean” owing to the long slender roundish purple pods, 12 in. or more long, which are borne after the trusses of large tubular bell-shaped flowers in July. These are white, speckled and blotched with purple. The leaves are highly ornamental, being ovate, cordate, and 6–10 in. long. The variety *aurea* has golden-tinted leaves, and is usually grafted on seedling stocks of the type. *C. cordifolia* (*speciosa*) is another fine American tree, while *C. Bungei* comes from China and *C. Kämpferi* from Japan. A good trade is done in plants from 1½–7 ft. high, costing from 5s. to 20s. per dozen.

**Ceanothus**.—Ornamental North American shrubs, somewhat tender in places, and usually grown on warm walls. *C. americanus*—the New Jersey Tea plant—has clusters of white flowers; *C. azureus* has long dense racemes of pale-blue flowers in early summer. There are many varieties, the best being “Gloire de Versailles”, with deep-blue flowers. One called “Albert Petit” has pinkish blossoms. *C. Veitchianus* is a fine Californian shrub with deep-blue flowers. All kinds are raised from seeds, cuttings of the ripened shoots, and by layers.

**Celastrus** *scandens*.—A climbing North American shrub, with ovate serrated leaves, and racemes of pale-yellow flowers in summer, succeeded by orange-coloured berries. Increased by seeds and layers.



• **Cerasus** (CHERRY).—There are three groups of Cherries, viz.: (1) the Cherries proper, (2) the Bird Cherries, and (3) the Laurel Cherries, all put under the genus *Prunus* by botanists. Amongst the first group is *C. Avium*, the British Wild Cherry or Gean, a fine tree 20–30 ft. high, with white flowers and black fruits. *C. vulgaris*, another British tree, has several forms, including *flore pleno* and *multiplex*, both double white; and *lutea flore pleno*, semi-double, tinted with yellow. *C. serrulata*, a splendid Chinese Cherry, has clusters of pale-white or rose-tinted double flowers. *C. Pseudo-cerasus*, another Chinese species, has single and double varieties with white or rose-pink flowers, *Watereri* and *Jas. H. Veitch* being among the best doubles.

Among the Bird Cherries are the native *C. Padus*, with several varieties, like *argentea*, *aucubæfolia*, and *flore pleno*—the latter a fine double form. *C. Mahaleb* is largely used for stocks for budding and grafting.

The Cherry Laurel (*C. Lauro-cerasus*) is grown in thousands, and has many varieties, the best known being *caucasica*, *colchica*, *rotundifolia*, *macrophylla*, *Ottini*, &c., all of which stand clipping well. *Zabeliana* is a very distinct and pretty variety, with smaller and narrower leaves, closely arranged.

The Portugal Laurel (*C. lusitanica*) is also largely grown for hedges and game coverts. The variety *myrtifolia* has smaller leaves, while *azorica* has larger leaves than the type.



Fig. 417.—*Chionanthus retusus*. (½.)

**Cercis Siliquastrum** (JUDAS TREE).—This is the best known. It grows 20–30 ft. high, and has peculiar bluntly heart-shaped notched leaves and clusters of bright-purple, pale-rose, or whitish flowers in May. It requires protection in cold places. *C. canadensis* has bright-rose flowers. Increased by seeds and layers.

**Chionanthus virginicus** (FRINGE TREE).—A pretty North American tree or shrub, with oblong lance-shaped leaves and drooping clusters of pure-white flowers with narrow fringe-like petals. *C. retusus* (fig. 417), from China, has leaves woolly beneath, and white sweet-scented

flowers. Increased by seeds, cuttings, or layers, or grafts on stocks of the Common Ash.

**Choisya ternata** (fig. 418).—A beautiful evergreen, known as the Mexi-



can Mock Orange, recognized by its glossy-green ternate leaves and pure-white sweet-scented flowers in April and May. Raised from cuttings and layers.

**Cistus** (ROCK ROSE).—Several species are grown, although they are suitable only for the milder parts of the kingdom. The flowers, although fleeting in character, are produced so profusely in succession that the bushes appear to be always in bloom during the season—from May to July. Propagation by seeds, layers, and cuttings. The kinds mostly



Fig. 418.—*Choisya ternata*



Fig. 419.—*Cistus ladaniferus*

grown for sale in pots are *ladaniferus*, the Gum Cistus (fig. 419), 4 ft., with narrow clammy leaves and white flowers, which in the variety *maculatus* have a purple blotch at the base of the petals; *laurifolius*, 5–6 ft., with ovate lance-shaped leaves and white flowers with yellow blotch at base of petals; *lusitanicus*, 3–5 ft., flowers white, blotched with purple at base; *monspeliensis*, 4 ft., with yellow blotch at base of white petals. The variety *florentinus* has wrinkled leaves, and white flowers yellow at the base and tipped with rose. Other species are *Cyprius*, *incanus* (or *villosus*), *populifolius*, *purpureus*, *salvifolius*, &c.

**Cladrastis tinctoria** (*Virgilia lutea*).—A small North American Leguminous shrub with drooping racemes of white pea-shaped flowers in May. Increased by seeds and cuttings of the roots.

**Clematis**.—Although there are over forty species of *Clematis* known,



all interesting, and many beautiful, they are of little value commercially in comparison with the garden hybrids that have appeared during the past sixty or seventy years. Hundreds of thousands are raised every year. The usual method of propagation is by grafting under glass from January to March. The principal stock used is that of *C. Vitalba*, the only British Clematis, popularly known as Traveller's Joy, Old Man's Beard, White Vine, &c. Stocks of *C. flammula* and *C. Viticella*, both natives of southern Europe, are also used, but perhaps chiefly on the Continent.

The process of grafting consists in splitting a shoot carefully through a joint with a sharp knife, so as to make two scions from the buds, which

are opposite each other. This work is done in a warm greenhouse, and it is astonishing to see how quickly and deftly an experienced gardener can perform it. Side grafting is usually practised, the scions being attached to the top piece of the root fibres with a piece of raffia. The whole is then placed in a 2½-in. pot in gritty soil, and placed in a close frame in a temperature of 70° to 75° F. Union soon takes place, and the young grafted plants are taken out at the end of a week or two to make room for succeeding batches. During the summer months, from June onwards, the plants are placed in the open air, having previously



Fig. 420.—Pot-grown Clematis Princess of Wales, trained on Wire Trellis

been shifted into 5-in. pots. They are plunged in beds of sifted ashes or tan, and each one is tied to a slender stake and labelled, for sale during the autumn, winter, and spring months. Another method of propagating Clematis adopted largely by some growers is to take cuttings of the ripened shoots about May or early June. Each cutting has two joints, and the leaves are retained to the upper one. About 100 such cuttings are inserted in a shallow wooden tray or cutting box, using a gritty soil. They are kept shaded and close under glass for a short time until "callused", but are placed in the open air about the end of July or August, fully exposed to the light and air, and are watered as required. They are shifted from the cutting boxes during the winter months, each one being placed in a 3-in. pot, and under the genial warmth of a greenhouse are started into growth. Clematis raised thus on their own roots are preferred to grafted plants by some. For early summer trade, established Clematises are brought into flower in April and May



by placing the plants in heat in batches from January onwards. The stems are either twisted round stakes or tied out on wire trellises in the form of balloons, as shown in fig. 420, or some other design.

There are several groups of garden Clematis, the best known being—

1. JACKMANNI GROUP.—The typical hybrid was raised and flowered in 1862 by Messrs. Jackman, of Woking, by crossing *C. lanuginosa* with a *C. Hendersoni*, the latter a hybrid raised from *C. Viticella* and probably *C. integrifolia* and distributed in 1835. It is still one of the most popular, and its intense violet-purple cross-like flowers are seen in almost every part of the kingdom from July to October. Other varieties of *Jackmanni* are *superba alba*, white faintly tinted; *Snow White*, pure white; *Madame E. André*, velvety red, fig. 421; *Lady Northcliffe*, deep lavender; *Madame Baron Vieillard*, lilac rose; *Prince of Wales*, deep purple; *Star of India*, reddish violet tinted with purple and barred with red; *rubra*, rich crimson purple; *velutina purpurea*, blackish mulberry.

2. LANUGINOSA GROUP.—The typical *C. lanuginosa* is a native of China, whence it was introduced in 1851. It flowers from June to October, and has given rise to such fine broad-petalled varieties as *alba magna*, white; *Beauty of Worcester*, double, bluish violet (fig. 422); *Anderson Henryi*, creamy white; *Excelsior*, deep mauve; *Fairy Queen*, pale flesh with pink bar; *Lady Caroline*



Fig. 421.—Clematis Madame Édouard André



Fig. 422.—Clematis Beauty of Worcester



*Neville*, delicate bluish white with mauve bars; *La France*, deep violet purple; *Lord Neville*, deep plum colour, crimped; *Marie Van Houtte*, white, suffused with mauve; *Imperatrice Eugenie*, pure white; *Mrs. Bush*, pale lavender; *Princess of Wales*, bluish mauve; *Queen Alexandra*, pale lavender to white; *William Kennett*, deep lavender, &c.

3. PATENS GROUP.—The typical *C. patens* is a native of Japan, with three to five leaflets, and flowers from May to July, the blooms being 5–6 in. across and with six to eight delicate mauve sepals. Amongst the best garden forms are *Albert Victor*, deep lavender, pale bar; *Duke of Edinburgh*, violet purple; *President*, purple claret; *Edouard Defossé*, deep mauve; *Fair Rosamund*, blush white barred with red; *Lady Londesborough*, bluish lilac with pale purple bar; *Miss Bateman*, white; *Marcel Moser*, French white with pink bar; *Mrs. George Jackman*, white with creamy bar; *Sir Garnet Wolseley*, pale blue barred with plum red; *The Queen*, violet.

4. FLORIDA GROUP.—*C. florida* is also a Japanese plant and has creamy white flowers with six to eight sepals, borne from April to September on the wood of the previous season. Garden forms are *Belle of Woking*, silver grey, double; *Countess of Lovelace*, bright bluish lilac; *Duchess of Edinburgh*, pure white; *Fortunei*, white, double; *John Gould Veitch*, pale blue or lavender; *Lucie Lemoine*, white, double; *Venus Victory*, pale lavender, double.

5. VITICELLA GROUP.—*C. Viticella* is a native of southern Europe and western Asia, and has drooping blue, purple, or rosy flowers about 2 in. across, borne on the current year's shoots from July to October. The plants require to be pruned severely in the same way as the Jackmanni section. Garden forms are *Lady Bovill*, greyish blue, cup shaped; *Madame Grange*, crimson violet, shaded red in the centre; *Mrs. James Bateman*, pale lavender; *rubra grandiflora*, bright claret red; *Thomas Moore*, bright magenta; *Kermesina*, bright red; *Ascotensis*, azure blue; *Ville de Lyon*, bright carmine red.

Other Clematises grown are *C. coccinea*, an American species with tubular or top-shaped scarlet or crimson flowers reflexed at the tips. It has been crossed with other varieties, and some of the best forms at present are *Countess of Onslow*, violet purple, banded with red; *Duchess of Albany*, bright pink and lilac; *Duchess of York*, bluish pink.

All the above grow freely in the open air, and are extensively used for covering arches, trellises, poles, pergolas, &c. There are several other hardy Clematises, natural species, to be met with chiefly in botanical collections, and of no great commercial value or beauty. Amongst them are *alpina* (also known as *Atragene*), with ten to twelve blue or white segments, in May and June; *cærulea*, violet, June and July; *flammula*, creamy white; *heracleæfolia*, purplish blue Hyacinth-like flowers, which in the variety *Davidiana* are a bright lavender blue, and in the variety *Hookeri* lilac; *montana*, a well-known climber with very long stems, and pure-white cross-shaped flowers in April and May; the variety *rubens* has

soft rose-red flowers; *orientalis* (or *graveolens*), greenish yellow, scented, August and September; *recta*, rather bushy habit, with sweetly scented white flowers from June to August; *Viorna*, dull-reddish purple, balloon shaped, &c.

Special mention should be made of *C. indivisa*, a charming New Zealand species, with pure-white starry flowers about 3 in. across, borne from February to March and April. It is best grown in a greenhouse, and can only be considered hardy in the very mildest parts of the kingdom.

**Clerodendron.**—There are two hardy shrubs in this genus worth noting, viz. *C. foetidum* (*Bungei*), a Chinese plant, 5 ft. high, with large downy heart-shaped leaves and dense clusters of lilac-rose flowers in August, remarkable for the very disagreeable odour of the leaves when bruised; and *C. trichotomum*, from Japan, 6–20 ft. high, with ovate serrate leaves and white sweet-scented flowers with reddish or purple inflated calices. These plants require warm and sheltered situations, and may be increased from seeds, cuttings, layers, and root cuttings.

**Clethra.**—There are several species, the best known being the American *alnifolia*, 3–4 ft., with Alder-like leaves and racemes of white flowers from July to September, and *arborea*, from Madeira, 8–10 ft. high; *acuminata*, 10–15 ft.; *paniculata*, *scabra*, and *tomentosa*, all from North America, and 3–4 ft. high; all have white flowers. To these may be added *canescens*, from China and Japan, which has racemes of white Hawthorn-like flowers in July.

**Clanthus puniceus** (NEW ZEALAND PARROT FLOWER).—A distinct shrub, 6–15 ft. high, with pinnate leaves and large brilliant scarlet pea-like flowers in early summer. It requires warm



Fig. 423.—*Clanthus Dampieri*

sheltered spots. The “Glory Pea” of Australia (*C. Dampieri*) grows about 2 ft. high. It has silvery hairy leaves and drooping clusters of scarlet flowers, each with a brilliant black blotch at the base of the upper (standard) petal (fig. 423). This species is usually grafted on stocks of *Colutea arborescens*.

**Colutea arborescens** (BLADDER SENNA).—A quick-growing shrub, 6–10 ft. high, with graceful pinnate leaves and racemes of yellow flowers from June to August, followed by large bladder-like pods tinted with red



when ripe. There is a dwarf variety called *pygmaea*, and a few other species not so well known. Easily raised from seeds, and grows in any poor soil. Suitable for railway embankments and such places.

**Comptonia** (*Myrica*) *asplenifolia* (SWEET FERN).—A distinct North American shrub, 3–4 ft. high, having sweet-scented deciduous Fern-like leaves and small flowers. It flourishes in moist peaty soil, and is increased by layers, offsets, suckers, and seeds.

**Coriaria** *myrtifolia*.—A pretty South European shrub, 3–6 ft. high, with Myrtle-like leaves and small greenish flowers, succeeded by fleshy poisonous berries. *C. terminalis* has drooping branches, laden with clear golden berries in autumn; and *C. japonica* has bright-red fruits. Increased by seeds, layers, and suckers.

**Cornus** (CORNEL, DOGWOOD).—There are several more or less ornamental shrubs belonging to this genus. *C. alba*, 10 ft., has creamy-white flowers and white fruits. The variety *Späthi* is a fine foliage plant, the leaves being bronzy in spring, changing to green with an irregular golden border in summer. *C. capitata* (perhaps still better known as *Benthamia fragifera*) is the “Strawberry Tree” of Northern India and China. It grows 40 ft. high in favoured spots, and has clusters of white flowers succeeded by large globular red fruits composed of many hexagonal drupes. *C. florida* is the “Flowering Dogwood” of the United States. The greenish-yellow flowers have four large white bracts. *C. Kousa* (*Benthamia japonica*), from Japan, is a beautiful shrub, with large white bracts. *C. Mas* (or *Mascula*) is the Cornelian Cherry, 10–15 ft., with yellow flowers from February to April. It is very largely grown, and has several varieties, including *variegata*, with green and silvery foliage; *elegantissima*, creamy white tinged red; and *aurea tricolor*, with white, red, and yellow shades. *C. sanguinea*, the Common Dogwood of Britain, is remarkable for the deep vinous red of its stems so conspicuous in winter. Its creamy-white flowers are succeeded by small black berries. There are several varieties, including a variegated one.

**Coronilla** *Emerus* (SCORPION SENNA).—An elegant somewhat hairy South European shrub, 3–6 ft. high, with pinnate leaves and clusters of yellow pea-like flowers. Increased by seeds or cuttings.

**Corylus** (HAZEL).—The Common British Hazel or Filbert (*C. Avellana*) grows to a height of 20 ft. or more, and is highly valued. It has several varieties, including *purpurea*, with rich-purple leaves; *aurea*, golden; *heterophylla* or *laciniata*, deeply cut; and *pendula*, weeping. The common kind is easily raised from seeds, and the varieties are grafted on it, or are layered. *C. Colurna*, 30–60 ft., from Asia Minor, grows well in parts of the British Islands. It has whitish flaky bark, and roundish heart-shaped leaves.

**Cotoneaster**.—A genus of very ornamental shrubs, some being ever-green, others deciduous, but all useful for garden or rockwork decoration, or for forming game coverts. The flowers in all cases are white and Hawthorn-like, and bright-red or crimson fruits appear in autumn and

last during the winter. Many of them are easily raised from seeds, and these provide stocks upon which other kinds are grafted. Cuttings and layers are also made. Amongst the best evergreen *Cotoneasters* are *buxifolia*, *microphylla*, *pannosa*, *rotundifolia*, and *thymifolia*; and amongst the deciduous species—*acuminata*, *affinis*, *bacillaris*, *frigida*, *horizontalis*, *integerrima* (or *vulgaris*), *laxiflora*, *multiflora*. *Nummularia* (semi-evergreen), *Simonsi*, and *tomentosa*. Of these, *Simonsi* is grown in very large numbers for game coverts and also to supply stocks for grafting.

**Cratægus.**—The best-known member of this large genus is the Hawthorn, Quick, or May Tree, *C. Oxyacantha*, well known by its lobed leaves, somewhat spiny stems, and glorious masses of white (or pink) sweet-scented flowers in May and June. It is raised in thousands from seeds to form quickset hedges, and to provide stocks upon which the choicer varieties are grafted. These are numerous, the best known being the double whites, double scarlets, double pinks, and also the single-flowered scarlet known as *Gumperi*. The variety *præcox* is famous as the Glastonbury Thorn, which comes into bloom at Christmas in mild winters. There are varieties having yellow fruits, like *aurantiaca* and *aurea*.

The Cockspur Thorn (*C. Crus-galli*) is a North American tree, 10–30 ft., with white flowers tinted red, and having scarlet fruits. *C. Carrièrei* is remarkable for its fine scarlet fruits, as is *C. coccinea*, another North American Hawthorn with several varieties.

The Fire Thorn or *Pyracantha* (*C. Pyracantha*) is a well-known evergreen with sheets of white flowers in May and myriads of orange-scarlet fruits in winter. The variety *Lælandi* is considered the best. Other kinds are *Korolkowi*, with yellow fruits; *pinnatifida*, with several varieties; and *tanacetifolia*, with deeply cut downy leaves.

**Cytisus** (BROOM).—Apart from the lovely greenhouse plant *C. fragrans* (see Vol. II, p. 165), there are several ornamental shrubs grown in large numbers, many of them being easily raised from seeds, while the choicer or rarer kinds are increased by cuttings, layers, or grafting. Amongst the best-known kinds are *albus*, 6–10 ft., white; *Ardoini*, a dwarf trailing shrub, 1 ft., with yellow flowers; *biflorus*, 3 ft., bright yellow; *kewensis* (a hybrid between *albus* and *Ardoini*), with creamy-yellow flowers; *nigricans*, 3–6 ft., yellow; *præcox*, 8–10 ft. (a hybrid between *purgans* and *albus*), sulphur yellow, and one of the first to flower; *purpureus*, a trailing shrub with purple flowers. There is a white-flowered variety, *albus*, and a yellow one called *ratibonensis*; *Scoparius* is the common British Broom, with twiggy branches and bright-yellow flowers from April to July. There are several varieties in which white and pale-yellow flowers appear, and also double ones; *Andreanus* (often called *Genista*) has yellow flowers blotched with rich brownish purple. It is a favourite pot plant for early forcing.

**Daboecia polifolia** (ST. DABEOC'S HEATH).—A pretty Irish Heath-



like shrub, 1–2 ft. high, with dark-green leaves and racemes of globular flowers of white, pink, crimson, or purple, according to variety. One, called *bicolor*, has white and purple flowers. This species likes a moist peaty soil, well drained, and may be increased by seeds, cuttings, and layers.

**Daphne.**—A genus with several species of trailing or bushy shrubs, fond of a peaty soil, or a good mixture of leaf soil and loam. The rarer kinds are increased by layers or cuttings, but the commoner ones, like *Mezereum* and *Laureola*, may be raised from seeds. The best-known kinds are *Blagayana*, a European evergreen, 1 ft. high, with dense clusters of fragrant white flowers in April; *Cneorum*, a narrow-leaved trailing shrub with bright-pink or deep-rose flowers; *Genkwa*, 2–3 ft., Japan, with lilac flowers in March and April; *Laureola*, the Spurge or Wood Laurel, a British evergreen, 3–4 ft. high, with sweet-scented yellowish-green flowers from January to April, succeeded by black poisonous berries; *D. Mezereum*, the Common Mezereon of Britain, 2–4 ft. high, deciduous, with purple-pink or white flowers on the leafless branches from January to April, succeeded by white, red, or orange poisonous berries.

**Daphniphyllum glaucescens.**—A beautiful shrub, 6–8 ft. high, from China and Japan, with Rhododendron-like leaves having a bluish-white under surface. Increased by cuttings or layers. *D. jezoense* is a similar but dwarfer kind.

**Desfontainea spinosa.**—A fine evergreen Holly-like shrub from the Chilian Andes, attaining a height of 10 to 20 ft. in the Channel Islands, parts of Ireland, and other favoured spots. It has tubular scarlet flowers tipped with yellow. It is raised from cuttings or layers, and flourishes in a compost of peat and loam.

**Deutzia gracilis.**—This Japanese shrub is largely forced into early bloom during the winter months, and is valued for sprays of pure-white flowers. It is raised from cuttings or layers in the open air or in cold frames, and when the plants are well established, and large enough, they are lifted and potted in early autumn, and placed in frames. From November onwards batches are introduced to a warm greenhouse as required, and growth is promoted by daily syringings and watering until the flowers appear. The plants are then placed in a cooler place to become hardened off for market. Old plants, if pruned hard back after flowering, will throw out strong young shoots for blooming the following season. Deutzias flourish in a loamy soil with a little sand and well-rotted manure or leaf mould. Such kinds as *crenata*, *discolor*, *parviflora*, and the hybrid *Lemoinei* are stocked by nurserymen.

**Diervilla (Weigela).**—The most popular species is *D. florida*, formerly better known as *Weigela rosea*. It is a deciduous Chinese shrub, 6–8 ft. high, with masses of tubular rose or white flowers in April and May. There are several varieties, including *amabilis* or *grandiflora*, of which there are also many forms, such as *Isolina*, *striata*, *Van Houttei*, *Stelzneri*, &c. Other species are *canadensis* and *sessilifolia*, both with yellow

flowers; and *Middendorffiana*, yellowish white dotted with pink. There are now several hybrid forms, of which the crimson-red *Eva Rathke* and the red-purple *Abel Carrière* are the best. These plants are easily raised from cuttings, layers, or suckers, and also from seeds, and flourish in any good garden soil.

**Elæagnus.**—Distinct-looking shrubs or small trees often covered with silvery scales. They flourish in ordinary good soil, and are increased by seeds, cuttings, layers, or grafting. The best-known kinds are *angustifolia*, *argentea* (the Missouri Silver Tree), *glabra*, *hortensis*, *longipes*, *macrophylla*, *pungens*, and *umbellata*. They make fine dense bushes, the variegated forms of *pungens* being particularly attractive.

**Embothrium coccineum** (FIRE BUSH).—A beautiful Chilian tree with oblong leaves and drooping racemes of orange-scarlet blossoms in summer. It likes sandy peat, and may be increased by cuttings or layers. It is only hardy in the mildest parts of the kingdom, where it grows 20 ft. or more in height.

**Erica** (HEATH).—Amongst dwarf evergreen shrubs Heaths occupy an important position. They flourish in a peaty soil, or in one composed chiefly of leaf mould, and will also do well in a mixture of peat and loam. Thousands of plants are grown in some nurseries, indicating a good volume of trade. With the exception of such kinds as *arborea*, *ciliaris*, *cinerea*, *codonodes*, *mediterranea*, and *vulgaris*, which attain a height of 2 to 10 ft., the average height is between 6 and 18 in. They form bold masses of greenery, and when in bloom they are decidedly attractive. Propagation is by seeds, cuttings, and layers. Amongst the best-selling kinds are *arborea*, white, rather tender; *carnea* (*herbacea*), white, pink, and purple varieties, in flower from January to April; *ciliaris*, the Dorset Heath, pale red, from June to September; *cinerea*, crimson purple, July to September. There are white-flowered varieties with larger and smaller flowers than the type. *Codonodes (lusitanica)*, the Spanish Heath, grows up to 10 ft. high in the south, flowers white or tinted rose, from January to May; *mediterranea*, white and pink, April and May; the variety *hibernica* (Irish Heath) grows 5 ft. high. *Hybrida*, said to be a cross between *mediterranea* and *carnea*, produces its bright pink-purple flowers profusely from Christmas to March and April. *Tetralix*, the Cross-leaved Heath, has downy leaves and terminal clusters of rose-red flowers from July to September. There are several varieties, including a deep-red one, *rubrum*. The Cornish Heath, *E. vagans*, has pink flowers, with conspicuous protruding anthers. There are several varieties—*alba*, *grandiflora*, *leucantha*, *rubra*, &c. July to September. The Common Ling, *E. vulgaris* (*Calluna*), has many varieties, some with double flowers and some with variegated and golden foliage, the best-known being *alba* (the "White Heather"), *Alporti*, *aurea*, *erecta*, *Hammondi*, *minor*, *pilosa rigida*, *Serlei*, *tenella*, *tomentosa*, &c. July to September. The Greenhouse Heaths are dealt with in Vol. II, p. 173.

**Escallonia.**—A genus of pretty South American shrubs, quite hardy



in the milder parts of the kingdom, especially near seaside places. They flourish in ordinary good soil, and are raised from cuttings in cold frames or in the open in sheltered spots. The best kinds include *macrantha*, red to crimson; *Philippiana*, white; and *rubra*, with red and white flowers. *E. exoniensis* is a hybrid between *rubra* and *Philippiana*, with white flowers, and *Langleyensis* is a hybrid between *macrantha* and *Philippiana*.

**Euonymus.**—A genus of evergreen and deciduous shrubs, many of which are remarkable for the coloured tints of their foliage in autumn, especially the common European “Spindle Tree” (*E. europæus*). This and the North American *americanus* and *atropurpureus* are also bright in autumn with their orange or scarlet capsules. For trade purposes, however, the Japanese *E. japonicus* is the most popular, and its varieties, of which *albo-marginatus*, *aureo-marginatus*, *latifolius albus*, *l. aureus* are among the best. The green-leaved form is not so valuable, but it sells well for hedges, in various sizes, from a few inches up to 2 or 3 ft. It is frequently attacked by the maggots of the Small Ermine Moth in summer, when the soil is badly tilled. The green and golden varieties are sold in thousands for window boxes, edges, borders, &c., and are raised from cuttings in cold frames whenever obtainable. In some places they require protection in winter when young. *E. microphyllus* is a pretty kind with small glossy green leaves, and is well adapted for edging work. *E. radicans* is a rambling or climbing species, useful for edges or for training up walls, &c. There are several pretty forms of it, including *variegata*, *Silver Gem*, *foliis pictis*, *roseo-argenteis*, *tricolor*, &c.

**Exochorda grandiflora** (PEARL BUSH).—A pretty Chinese shrub, 6 ft. high, with lance-shaped serrulate leaves and large white flowers. *E. Alberti*, from Persia, attains a height of 12 ft. Warm sheltered positions and loamy soil are necessary. Raised by seeds, layers, cuttings, and suckers.

**Fagus sylvatica** (BEECH).—This well-known British tree is raised in thousands annually from seeds, and is used for hedges and timber. There are numerous varieties, including the purple-leaved ones, *atropurpurea*, *purpurea*, and *Handsworthiana*; the golden and silver variegated forms, *aureo-variegata* and *argenteo-variegata*; *cuprea*, copper-coloured foliage; *heterophylla* (*incisa*, *asplenifolia*), with deeply cut Fern-like leaves; *macrophylla*, large leaved; and others. These special varieties are grafted on stocks of the common Beech under glass or in the open.

**Forsythia.**—Splendid shrubs of irregular growth, from China and Japan. *F. suspensa* (*Fortunei*) has long slender shoots wreathed with clear-yellow flowers in February and March. *F. viridissima* is a more bushy plant, 4–8 ft. high, with dark-green lance-shaped leaves and yellow flowers in March. *F. intermedia* is a hybrid between the two.

**Fraxinus excelsior** (ASH).—Thousands of young plants are raised from seeds every year, the Ash being a valuable timber tree as well as an ornamental one. There are several varieties, such as *aurea*, with yellowish



bark; also a golden-leaved weeping form, *laciniata*, with deeply cut leaves. The Flowering or Manna Ash (*F. Ornus*) makes a fine tree. It has drooping clusters of white flowers. There are other species, like *americana*, the White American Ash; and *pubescens*, the Red or Black Ash. The choice varieties are grafted on common stocks.

**Fuchsia.**—In the mildest parts of the kingdom Fuchsias attain the dignity of hardy shrubs, and make splendid flowering hedges or garden ornaments. The best kinds for the open air are *conica*, scarlet sepals, purple petals; *coccinea*, scarlet sepals, violet petals; *corallina*, crimson sepals, deep-purple petals; *globosa*, purple-red sepals, purple-violet petals; *gracilis*, scarlet sepals, purple petals; *macrostemma* (*magellanica*), scarlet sepals; *Riccartoni*, deep crimson. (See also Vol. II, p. 171.)

**Garrya elliptica.**—A pretty North American evergreen shrub with leathery leaves and yellowish-green catkins from November to February. The pollen-bearing (male) plant (fig. 424) is handsomer than the seed-bearing one. Grows in any good garden soil in sheltered spots, and is raised from cuttings or layers.

**Gaultheria.**—Dwarf or trailing North American shrubs useful for carpeting the ground with their evergreen foliage. *G. procumbens* grows 4 to 6 in. high, its white tubular flowers appearing over the lance-shaped leaves about July and August. *G. Shallon*, 2–3 ft. high, has broadly heart-shaped leaves and racemes of pink and white flowers. There are a couple of Himalayan species (*nummularioides* and *trichophylla*) and one from New Zealand, *antipoda*, not well known. They like a peaty soil, and are increased by seeds, layers, or cuttings.

**Genista.**—Ornamental flowering twiggy shrubs closely related to the Brooms (*Cytisus*), and easily grown in any garden soil, or even a poor soil. Most of them are easily raised from seeds. The best known are *ætnensis*, the Mount Etna Broom, 10 ft.; *hispanica*, the Spanish Gorse, with spiny branches; *pilosa*, trailing stems; *tinctoria*, the Dyers' Greenweed, with a tall-growing form, *elatior*; and *virgata*, 10–15 ft.—all with bright golden-yellow flowers freely produced in summer.

**Griselinia littoralis.**—This and *G. lucida* are fine New Zealand evergreens with shining-green leathery leaves. Chiefly useful for seaside planting in the most favoured spots.



Fig. 424.—*Garrya elliptica* (pollen-bearing catkins). ( $\frac{1}{2}$ .)



**Halesia.**—This includes several species of deciduous shrubs, the best known being *H. tetraptera*, the Snowdrop Tree, so called from its drooping clusters of pure-white snowdrop-like flowers in May. Sandy loam; layers and cuttings of the roots in heat.

**Hamamelis virginica** (WITCH HAZEL).—This hardy North American shrub, with obovate leaves and clusters of twisted fringe-like yellow flowers, is the best known. Other kinds are *arborea*, *japonica* and its variety *Zuccariniana*, and *mollis*—all from Japan and China. All kinds flower on the leafless branches between December and March. They grow in ordinary soil, and are raised from layers.

**Hedera Helix** (IVY).—There are many kinds of Ivy in cultivation, and they are roughly divided into two groups—(1) the Tree Ivies (*arborescens*), and (2) the Climbing Ivies. A great trade is done in both. The Tree Ivies are raised by cuttings from the flowering branches of the others, and are distinguished by having a shrubby or bushy habit, and have the leaves not deeply divided. The silver and golden variegated varieties are usually grafted on stocks of the Tree Ivies.

The Climbing Ivies are valued for clothing walls, pillars, making borders, or for planting on bare ground beneath large trees. They are easily propagated by cuttings or by grafting. Some of the best variegated climbing sorts are *aurea densa*, *canariensis aurea*, *Cavendishi*, *Cænowoodiana aurea*, *Golden Cloud*, *dentata aurea*, *hibernica albo-marginata*, *Jubilee*, *La Reine* (silver and gold), *maculata major* and *minor*, *Mrs. Pollock*, *palmata aurea*, *spectabilis aurea*.

The fruits of Ivies are generally dull-green or neutral-tinted in colour, but there are a few varieties in which they are yellowish, as in *chrysocarpa*.

**Hedysarum multijugum.**—A Chinese Leguminous shrub, 3–5 ft. high, with silky pinnate leaves and racemes of pale-red flowers. Increased by seeds and cuttings.

**Helianthemum** (SUN ROSE).—A genus closely related to the Cistus, and having several species of shrubby plants suitable for dry sunny places. In most cases the flowers are yellow with a dark crimson or purple blotch at the base of the petals. The best-known kind is *vulgare*, a trailing British plant having single- and double-flowered varieties with shades of yellow, rose, magenta, crimson, &c. The Portuguese *H. formosum* has yellow flowers with purple blotches, and grows about 4 ft. high.

**Hibiscus syriacus** (*Althæa frutex*).—An ornamental deciduous Syrian shrub, 6–8 ft. high, with lobed and toothed leaves, and Mallow-like purple flowers in August and September, with a crimson spot at the base of the petals. There are white, yellow, purple, rose, violet varieties, one of the best being *cælestis*. There are also double forms. Increased by cuttings or layers. Warm sheltered spots are best.

**Hippophae rhamnoides** (SEA BUCKTHORN).—A fine deciduous British shrub or small tree with somewhat spiny branches, narrow silvery leaves, and masses of orange-coloured berries on the female plants during the



SOME MARKET DAFFODILS

1. Horsfieldi.

2. Sir Watkin.

3. Emperor.

4. Maximus





autumn and winter months. Flourishes in sandy soils, and also near streams, &c. Increased by layers and seeds.

**Hydrangea.**—A genus of ornamental shrubs with deeply veined leaves and large trusses of flowers, which are sometimes all sterile and sometimes sterile and fertile together. *H. Hortensia* and *H. paniculata* are largely grown as pot plants for market (see Vol. II, p. 175), but are perfectly hardy in the open air in the milder parts of the kingdom, flourishing in any good garden soil. Other kinds are *arborescens*, *quercifolia*, and *radiata*, from North America; and *petiolaris* (*scandens*), from Japan. The last-named is a climber with large trusses of white flowers; it requires sheltered spots.

**Hymenanthera crassifolia** (fig. 425).—An ornamental New Zealand shrub, 2–4 ft. high, resembling a white-berried Cotoneaster when in fruit in autumn. It flourishes in sandy peat and loam, and is increased from cuttings or seeds. Quite hardy in the milder parts of the kingdom.

**Hypericum.**—Of the 160 species known only a few are of commercial value. Some of the best known are *Androsæmum*, the Common British Tutsan or Sweet Amber, 1–2 ft. high, remarkable for the scent of its dried leaves; *calycinum*, commonly called the Rose of Sharon, an almost evergreen species, about 1 ft. high, and flowers 3 in. across; *Moserianum*, a hybrid between *calycinum* and *patulum*, and having a pretty variety called *tricolor*, the leaves of which are blotched with green, white, and rosy carmine; rather tender; *Hookerianum* (*oblongifolium*),



Fig. 425.—*Hymenanthera crassifolia*. (4.)

from Nepal, is an evergreen, 2–4 ft. high; *patulum*, a rather tender Japanese plant, 6 ft. high; *perforatum*, British St. John's Wort; and *uralum* from Nepal, 2 ft.—all with glossy yellow flowers and numerous conspicuous stamens. Most of them grow in any soil, and are useful for furnishing banks, beneath trees, &c. Propagation by cuttings and seeds.

**Idesia polycarpa.**—A rather tender Chinese tree, with large heart-shaped serrated leaves, and long drooping racemes of yellowish flowers—the males on one plant, the females on another. Increased by cuttings under glass.

**Ilex Aquifolium** (HOLLY).—The Common Holly and its numerous varieties are always favourites, owing to their ornamental glossy-green, silver, or golden foliage, and their masses of scarlet or orange-yellow berries in winter. They flourish in good loamy soil, and are extensively propagated from seeds, cuttings, layers, and grafts by nurserymen. The common kind is raised from seeds and is largely used for hedge purposes



and as stocks for the choicer varieties. Amongst the best of the green-leaved Hollies are *camelliæfolia*, *Donningtonensis*, *ferox* (Hedgehog Holly), *Foxi*, *Hendersoni*, *Hodgkinsi* (one of the finest broad-leaved Hollies), *ovata*, *platyphylla*, *Shepherdi*, *Whittingtonensis*, &c. The best Silver Hollies are *albo-marginata*, *argentea elegantissima*, *a. marginata*, *a. medio-picta*, *lucida* (or Silver Queen), &c. Golden-leaved Hollies—*aureo-marginata*, *a. picta*, *a. pumila*, *aurantiaca*, Golden King, Golden Queen, Golden Milkmaid, *Hodgkinsi aurea*, &c.

There are several beautiful species of Holly found in botanical collections, but not generally grown by nurserymen. The best are *cornuta*



Fig. 426.—*Ilex cornuta*



Fig. 427.—*Ilex opaca*. (½.)

(fig. 426), China; *crenata*, Japan, with a golden variegated form; *diphyrena*, a fine Himalayan plant; *latifolia*, Japan; *opaca* (fig. 427), North America; *Penryi* and *Veitchi*, two new distinct kinds from China; and several others.

**Indigofera Gerardiana** (*floribunda*).—A pretty Leguminous shrub, 2–3 ft. high, with slender arching shoots, pinnate grey-green leaves, and erect racemes of rose-purple flowers from July to September. Grows in any good garden soil, and quite hardy in the milder parts of the kingdom. Raised from seeds and cuttings. *I. decora*, from China and Japan, is an evergreen, 1–3 ft. high, having a reddish-purple and a white-flowered form.

**Jasminum**.—Several hardy species are grown for trailing or rambling purposes, and are raised from cuttings or layers. The winter Jasmine, *nudiflorum*, with yellow flowers on bare stems from November and December to April, is popular; there is a golden-leaved variety of it. The White Jasmine, *officinale*, flowers from June to September; *primulinum* is a somewhat tender Chinese species with semi-double bright-yellow



flowers, useful for forcing early in the year; *revolutum*, and *fruticans* are both evergreen species, the first-named having pinnate leaves, the other ternate ones, both with yellow flowers during the summer months. Other yellow-flowered species are *floridum*, from China, and *humile*, a shrubby plant, from India.

**Juglans.**—The Common Walnut (*J. regia*), from western Asia, is the best-known kind, and is referred to in more detail in Vol. III, p. 206, as a fruit tree. Other valuable ornamental Walnuts are *nigra*, 60–100 ft. high, North America; *cinerea*, very similar in appearance; *cordiformis* and *Sieboldiana*, from Japan; and *mandschurica*, from Amur. Raised from seeds.

**Kalmia.**—Ornamental evergreen shrubs from North America, of which the best-known kinds are *angustifolia*, the Sheep Laurel, 2–3 ft. high, with oblong leaves and corymbs of purple or crimson bell-shaped flowers. There are a few varieties: *glauca* has grey-green leaves and lilac-purple flowers in April; and *latifolia*, the Calico Bush, 3–10 ft. high, with broader leaves and masses of rose to white flowers. All kinds flourish in peaty soil and in loam with plenty of leaf mould, and are raised from seeds and layers.

**Kerria (Corchorus) japonica.**—A pretty Japanese shrub, 3–5 ft. high, with green stems, lance-shaped serrate leaves, and orange-yellow flowers. There is a good double-flowered form (*flore pleno*), a white-flowered one (*alba*), and one with silver variegated leaves. Grows in any garden soil, and increased by cuttings.

**Kœlreuteria paniculata.**—A handsome Chinese deciduous shrub, 10–15 ft. high, with oddly pinnate leaves, that become yellow, bronze, and purple in autumn. The yellow flowers are borne in panicles 2–3 ft. long in summer. Increased by cuttings of half-ripened shoots under glass, and by layering.

**Laburnum vulgare.**—The Common Laburnum is well known by its grey-green leaflets and drooping racemes of bright yellow Pea-like flowers in April and May. There are several varieties, including *aureum*, with golden leaves; *cristatum monstrosum*, a curious crested-leaved variety; *Parksi* and *Watereri* are both fine varieties with longer and deeper coloured racemes, and *quercifolium* has the leaflets lobed like Oak leaves. The purple Laburnum, *Adami*, is famous as a “graft hybrid” between *Cytisus purpureus* and the ordinary kind; it has sometimes yellow, sometimes purple flowers, and sometimes mixed. The Scotch Laburnum, *alpinum*, has large yellow flowers in June. All kinds grow in ordinary soil. Choice varieties are grafted on stocks of the common form which are easily raised from seeds.

**Laurus nobilis (SWEET BAY LAUREL).**—This well-known evergreen with aromatic deep-green leathery leaves is grown largely in tubs, &c., on the Continent and cut into various shapes, principally mop-head standards and pyramids, which are largely used for hotel and street decoration. It is somewhat tender in places, and thrives in a rich sandy loam, and is increased by cuttings, layers, and grafting. *L. Sassafras*, the North



American Sassafras Tree, 15–50 ft. high, has entire or three-lobed leaves which assume brilliant red and yellow tints in autumn.

**Lavender** (*Lavandula vera*).—"Sweet" Lavender is an important crop commercially in the neighbourhood of Mitcham, Surrey, and in parts of Hertfordshire around Hitchin and Elsenham. Small plants are largely grown for sale by many nurserymen.

The Lavender is a shrubby South European plant about 3 ft. high, with grey or hoary leaves, and long erect spikes of bluish-purple flowers in July and August. The plants flourish in any ordinary garden soil, but prefer a rather heavy loam on a chalky subsoil, and sunny situations sloping to the south. They are increased by slips or cuttings taken in August or September, and inserted in sandy soil under lights if possible. They root well by the following March, April, or May, and are then or the following autumn planted out about 1 ft. or 18 in. apart, and are often intercropped with Lettuces, Parsley, or other crops. The following year the plants in alternate rows are lifted to make a new plantation, thus leaving the others in rows about 3 ft. apart, or about 4840 to the acre. The ground is well dug, and hoed occasionally every year, and when the plants are about seven years old they are dug up, and new plantations are made.

In July in early seasons, but usually in August, the flower spikes are cut with sickles. The flowers are distilled to extract the pale-brown-coloured oil, which is worth about £8 per 4½-lb. bottle. The average yield per acre is about 25 lb. of oil, but in good seasons this is surpassed. About 600 cwt. of flowers are required to produce this quantity.

**Leycesteria formosa**.—A fine deciduous Himalayan shrub, 4–10 ft. high, with green hollow stems, ovate leaves, and drooping racemes of white tubular flowers with conspicuous leafy, purplish bracts. It grows in any soil and is easily raised from seeds and cuttings.

**Ligustrum** (PRIVET).—The Common British Privet, *vulgare*, is largely grown for hedging and game coverts, and has several varieties, including a broad-leaved one, *buxifolium*; one with golden-yellow instead of purple-black berries; and one with leaves variegated with gold. *L. ovalifolium*, from Japan, has larger leaves which remain longer on the plants in winter, and is grown in thousands for hedges. The golden-leaved variety

(*aureum*) is a splendid plant which shows its colour best in sunny places. It is raised from cuttings or is grafted on standards of the green kind. *L. japonicum* is a fine Japanese Privet, 6–8 ft. high, having oblong ovate



Fig. 428.—*Ligustrum coriaceum*.  
(½.)

glossy-green leaves. *L. coriaceum* (fig. 428) has very distinct-looking roundish leathery leaves; *Ibota* has ovate elliptic leaves; *lucidum*, 3 ft., has oval lance-shaped leaves; and *sinense* grows 12–20 ft. high. All the Privets have white tubular blossoms and are easily grown as bushes or mop-head standards, and all stand clipping well.

**Liquidambar** styraciflua (SWEET GUM TREE).—A beautiful North American tree, 30–50 ft. high, with lobed Maple-like leaves which become highly coloured in autumn. *L. orientalis*, 10–20 ft., is another species. Grows well in ordinary soil, and is raised from layers or imported seeds.

**Liriodendron** tulipifera (TULIP TREE).—This is the beautiful North American White Wood, easily recognized by its grey-brown bark, lobed leaves with the tips apparently cut off, and the soft yellow-green Tulip-like flowers at the tips of the shoots in May. There are a few varieties, like *aureo-maculata*, leaves blotched with yellow; *integrifolia*, entire leaved; and *variegata*. Grows in any good soil and is raised from seeds or layers.

**Lonicera** (HONEYSUCKLE).—A large and somewhat mixed genus of shrubby and climbing, evergreen and deciduous plants from Europe, Asia, and North America. The shrubby or Tree Honeysuckles include such species as *fragrantissima*, from China, with white or creamy-yellow, sweet-scented flowers in January and February; *hispida* (*bracteata*) from the Himalayas, 2–3 ft., with hairy stems, and drooping white flowers in early summer; *involutrata* (*Ledebouri*), blooms in summer, the yellow tubular corollas being tinted with purple red, and having a pair of purple bracts; *Standishi*, with fragrant white flowers tinted with purple in winter and spring, resembles *fragrantissima*, but has larger leaves; *tatarica*, grows 4–8 ft. high, and has small heart-shaped leaves and rosy flowers, but there are forms with white, yellow, and purple-red flowers. Other shrubby species are *tomentella*, white, and *Xylosteum*, yellow, with several varieties.

Amongst the trailing or twining Honeysuckles the common British one, *Periclymenum*, is one of the best. It produces its downy yellow flowers, tinted outside with red, from June to September. The Dutch Honeysuckle, known as *belgica*, is a stronger-growing plant; *quercifolia* has lobed Oak-like leaves; and *serotina* has deep-red flowers late in autumn. *L. brachypoda* has evergreen oval-oblong leaves, and fragrant pale-yellow flowers. It is mixed up with *flexuosa*, which has long lance-shaped leaves and pink and yellow flowers; and also with *japonica* (or *chinensis*), a somewhat tender climber with red flowers. The variety *aureo-reticulata* is an elegant climber with oval-elliptic leaves, beautifully veined with golden yellow. *L. Halleana* of nurseries is closely related to *japonica* and has white flowers changing to yellow. *L. sempervirens*, the Trumpet Honeysuckle from North America, is almost evergreen, and has brilliant scarlet flowers with a yellow interior. It is somewhat tender. Other species met with are *Caprifolium*, yellow and purple; *flava*, yellow, rather tender. *Loniceras* are propagated by cuttings, layers, or seeds.



**Magnolia.**—This genus contains several fine flowering trees or shrubs, mostly deciduous, but evergreen in such as *glauca* and *grandiflora*, the latter being well known for its large shining-green Laurel-like leaves and huge white flowers in summer. The deciduous kinds most largely grown for sale include *acuminata*, the North American "Cucumber Tree", 30–80 ft. high, with oblong pointed leaves, 6–12 in. long, and yellowish-green flowers; *Campbelli*, North India, with oval lance-shaped leaves and pale-rose and crimson flowers; *conspicua* (Yulan), one of the best-known Chinese kinds with obovate leaves and large erect fragrant white flowers produced on bare branches from February to April and later. There are several varieties, such as *Soulangeana* (fig. 429), white and purple; *Lennei*, rich purple; *Alexandrina*; and others. *M. Fraseri* (*auriculata*), large leaves, 1 ft. long, lobed at base, and white flowers; *hypoleuca*, large



Fig. 429.—*Magnolia Soulangeana*

creamy-white flowers; *macrophylla*, leaves 1–3 ft. long, flowers white with purple blotch at base of petals; *obovata*, 5–6 ft., flowers white within, purple outside; *parviflora*, flowers globular, white tinted rose; *salicifolia*, 15–20 ft., with Willow-like leaves and white six-petalled flowers; *stellata* (*Halleana*), 5 ft., with white starry flowers in February and March; *Umbrella* (*tripetala*), white; and *Wat-*

*soni*, creamy white. Magnolias are usually increased by layering, but also from seeds, cuttings, and by grafting on stocks of *acuminata* or *Umbrella*. Some kinds are rather tender.

**Morus** (Mulberry).—Three species—*alba*, *nigra*, and *rubra*—are stocked in nurseries, and are good for fruiting or ornamental purposes. The White and Black Mulberries are natives of the East, but the Red Mulberry (*rubra*) comes from the United States, where it attains a height of 70 ft. Increased by layers, or cuttings of the half-ripened shoots.

**Myrtus communis** (MYRTLE).—There are many varieties of the Common European Myrtle, differing chiefly in the length and width of the leaves, but all are beautiful evergreen shrubs with masses of white blossoms and long stamens during the summer months, often followed by dark-purple edible berries. They are only hardy in the very mildest parts of the kingdom. The narrow-leaved form is grown as a pot plant under glass, and in the form of miniature mop-headed standards sell readily. All kinds are readily increased by cuttings inserted in water or moist gritty soil during the summer months. A compost of sandy loam and peat is best. *M. Ugni*, from Chili, is a fine shrub with large red or black berries, but too tender for the open air.



**Nandina domestica.**—A handsome Chinese and Japanese evergreen shrub with pinnate leaves and panicles of small white flowers. Rather tender. Increased by cuttings of the half-ripened shoots under glass.

**Neviusia alabamensis.**—A small North American shrub with ovate-oblong serrate leaves and white or yellow-green flowers with numerous conspicuous stamens. It is rather tender, and is propagated by cuttings or layers.

**Nuttallia cerasiformis.**—A deciduous Californian shrub with oblong leaves and drooping racemes of small white flowers in March and April. Increased by layers, suckers, cuttings, and seeds.

**Olearia.**—Of the eighty-five species known only a few are grown in anything like large numbers. The New Zealand Daisy Bush (*O. Haasti*), is probably the hardiest and best known with its grey-green Box-like leaves and masses of white Daisy-like flowers in August. It is easily increased by cuttings and from seeds. *O. stellulata* (*Eurybia Gunniana*), from Tasmania, has whitish branches, lance-shaped coarsely toothed leaves, and white flowers in September. Other kinds are *dentata*, *Forsteri*, *insignis*, *macrodonta*, *nitida*, *nummulariaefolia*, *ramulosa*, and *Traversi*, all rather tender in most parts of the kingdom.

**Osmanthus Aquifolium.**—This handsome evergreen Japanese shrub, 4–6 ft. high, is easily mistaken for a green-leaved Holly owing to its deep shining-green prickly-toothed leaves, especially the variety called *ilicifolius*. There are several varieties, such as *albo-marginatum* and *aureo-marginatum*, *rotundifolium*, *purpurascens* (with purplish young leaves), and *myrtifolium* with Myrtle-like leaves. Other species are *americanus*, with lance-shaped leaves, and *fragrans*, with elliptic lance-shaped leaves. Sandy loam and leaf mould or peat is the best compost. Propagation by cuttings and layers.

**Pæonia Moutan** (TREE PÆONY).—This fine and somewhat tender Chinese and Japanese shrub, 4–5 ft., with divided leaves and pink flowers in May, is grown in many varieties now, the colours ranging from white to rose, salmon, lilac, magenta, &c. It is propagated chiefly by grafting on the tuberous roots of *P. officinalis*, under glass, and also by cuttings and suckers.

**Paliurus aculeatus** (CHRIST'S THORN).—A prickly Mediterranean shrub having ovate 3-nerved leaves and small greenish-yellow flowers. Increased by layers, root cuttings, and seeds.

**Parrotia persica.**—A pretty Persian tree with ovate-oblong leaves, which become finely coloured in autumn. The flowers appear in February, and are conspicuous by the crimson stamens. Increased by layers.

**Passiflora cœrulea** (PASSION FLOWER).—A well-known South American climber with lobed leaves and curious starry flowers the petals of which vary from white to pale blue and rose red. The variety "Constance Elliott", with white flowers, is the best. Quite hardy in the milder parts of the kingdom. The Passion Flower likes turfy loam and peat well drained, and is increased by cuttings and seeds.

**Paulownia imperialis.**—A fine deciduous Japanese tree, 40 ft. or more



high, with large heart-shaped leaves and clusters of purple-violet Foxglove-like flowers spotted inside with purple brown, rarely seen in Britain. It is chiefly used for subtropical effect in summer by inducing stout stems to spring up as the result of severe pruning. The Paulownia grows in any good garden soil, and is increased from seeds, cuttings of the ripened wood, and also by root cuttings.

**Periploca græca.**—A quick-growing shrubby climber with ovate or lance-shaped leaves, and hairy green-and-black flowers with a strong odour. Increased by layers and cuttings.

**Pernettya.**—This genus contains a few species of dwarf evergreen shrubs with deep-green leathery leaves, small white flowers, and masses of variously coloured berries in autumn and winter. They are excellent plants for massing in beds, on banks, or for rock gardens. They like a compost of sand, peat or leaf mould, and a little loam, and are increased by layering and from seeds. The best kind is *P. mucronata*, the Prickly Heath, a wiry shrub, 2–3 ft. high, from the Straits of Magellan. There are several varieties.

**Philadelphus** (MOCK ORANGE, SERINGA). — Ornamental deciduous shrubs, mostly easy to grow in ordinary garden soil, and remarkable



Fig. 430.—*Philadelphus Lemoinei*. (½.)

for their masses of four-petalled pure-white flowers, with masses of golden-knobbed stamens in the centre. Amongst the best-known kinds are the European *P. coronarius*, 6–12 ft. high, with flowers about 1 in. across. There are several varieties, such as *flore pleno*, double flowered; *aureus*, golden leaved; *argenteo-variegatus*, leaves variegated with silver. *P. Gordonianus*, from north-west America, 6–10 ft. high, with flowers about 2 in. across. *P. grandiflorus* or *speciosus* (now referred to as *latifolius*), also from North America, has flowers 3 in. across. *P. inodorus* has large scentless flowers and quite entire leaves. *P. Lemoinei* (fig. 430) is a fine hybrid between *coronarius* and *microphyllus*, with flowers over 1 in. across, and has fine varieties called *Boule de Neige* and *Boule d'Argent*. *P. micro-*

*phyllus* is a pretty Colorado shrub, about 3 ft. high, with wiry stems and small Myrtle-like leaves and flowers about 1 in. across; and *P. Satsumi*, from Japan, has long narrow leaves and flowers about 1½ in. across. The Mock Oranges flower during the summer from May till August, and are raised from cuttings, layers, seeds, and suckers.

**Phillyrea** *Vilmoriniana* (*decora*).—A splendid evergreen shrub, closely related to the Ash and Privet, 6–10 ft. high, from Asia Minor, with deep-green leathery Laurel-like leaves 4 to 6 in. long. The small white flowers are sometimes succeeded by reddish-purple Olive-like fruits. The plants flourish in good loamy soil, and are chiefly increased by layering, but grafting on the Privet stock is also practised. Other species are *angustifolia*, 6–10 ft., with several forms; *latifolia*, 20–30 ft., with varieties *ilicifolia* and *rotundifolia*; and *media*, 10–15 ft., with several varieties—all natives of South Europe.

**Phlomis** *fruticosa* (JERUSALEM SAGE).—A Mediterranean shrub, 2–4 ft. high, with wrinkled leaves, woolly-white beneath, and whorls of showy yellow flowers. Increased by seeds and cuttings.

**Photinia**.—A genus of Rosaceous shrubs, of which the best-known members are *japonica* (ERIOBOTRYA), the Japanese Loquat, an ornamental evergreen, 10–20 ft. high, with large oblong deeply veined leaves and racemes of white flowers, succeeded in warm countries by pale orange-red Quince-like fruits. Hardy in the milder parts of the kingdom and very ornamental. Easily raised from imported seeds, by cuttings, layers, and grafting on the Quince. *P. serrulata*, from China and Japan, has serrated Laurel-like leaves, and flat trusses of small white flowers between April and July.

**Pittosporum**.—A genus of ornamental evergreen shrubs, quite hardy in the very mildest parts of the kingdom, where they attain a height of 10–20 ft. The best kinds are *Buchanani*, *Tobira*, *crassifolium*, and *undulatum*.

**Platanus** (PLANE).—The American Plane (*P. occidentalis*) is a fine deciduous tree, rarely seen. What is known as the “London Plane” is a form of the Common or Oriental Plane (*P. orientalis*) called *acerifolia*, recognized by its divided Maple-like leaves. There are forms, such as *cuneata*, the leaves of which are distinctly wedge-shaped at the base; *laciniata*, with deeply divided lobes; and *variegata*, with leaves blotched and streaked with white and green. The London Plane (*acerifolia*) is a fine tree for town streets, and is largely grown, often under the name of *occidentalis*. Usually raised from seeds.

**Populus** (POPLAR).—Several kinds of Poplar are largely grown, being used as windbreaks, screens, &c. They flourish in almost any soil, but prefer damp situations. The most common kinds in commerce are as follows: *P. alba*, the Abele or White Poplar, 100 ft., has silvery-white leaves. The variety *Bolleana* resembles a Lombardy Poplar in habit; and *nivea* has leaves conspicuously white on the under surface. The Balsam Poplar (*P. balsamifera*) of North America is a fine tree with yellowish-green young leaves. There are several varieties of it, including the Ontario Poplar (*candicans* or *ontariensis*). The Lombardy Poplar (*fastigiata* or *pyramidalis*) is well known for its columnar or pyramidal habit. It is really a variety of the quick-growing Black Italian Poplar (*P. nigra*). The Aspen (*P. tremula*) is a fine British tree with a graceful drooping



variety, *pendula*. The commoner kinds of Poplar are raised from seeds, but special varieties are usually grafted.

**Prunus (PLUM).**—There are several species of flowering or ornamental Plums (as distinct from the fruit-bearing kinds), and a good trade is done in them. The Cherry or Myrobalan Plum (*P. cerasifera*), from the Caucasus, produces its white flowers in April, and is largely used for hedge purposes. The purple-leaved variety, *atropurpurea* (or *Pissardi*), is extensively grown, and sprays of foliage are largely used for decorative purposes by florists, &c. The Blackthorn or Sloe (*P. spinosa*) of the hedges has yielded a purple-leaved form and also one with beautiful double flowers. The finest-flowering Plum, however, is the double-flowered *P. triloba*, from China, which produces its masses of rose-tinted white flowers in great profusion at the end of March and early in April. The single-flowered type (fig. 431), with rose-white flowers, has been introduced of late years. The Plums flourish in good loamy soil, and are usually budded or grafted on common Plum stocks or layered. (See also “*Cerasus*”, “*Amygdalus*”).



Fig. 431.—*Prunus triloba*

**Ptelea trifoliata (HOP TREE).**—An ornamental North American tree or shrub, 10–15 ft. high, with trifoliate leaves, and clusters of small greenish-white flowers followed by winged hop-like seed pods. The variety *aurea* has golden young foliage. Loamy soil. Raised from seeds, layers, or cuttings.

**Pyrus.**—This genus not only includes the Apple, Pear, Quince, and Medlar, but also several fine ornamental flowering trees and shrubs. The North American Chokeberry (*P. arbutifolia*) (fig. 432) grows about 10 ft. high, and has oblong leaves, woolly beneath, and white flowers. The White Beam Tree (*P. Aria*), 40 ft. high, is a native of Britain, with variable and coarsely toothed divided leaves, whitish-woolly beneath, and loose corymbs of white flowers. The British Mountain Ash or Rowan Tree (*P. Aucuparia*) is one of the most largely grown. It grows up to 30 ft. high, and has ornamental pinnate leaves, creamy-white flowers, succeeded by masses of bright orange-red berry-like fruits in autumn. There are several varieties, like *asplenifolia*, with leaflets deeply cut; *aurea*, golden-tinted foliage; *fructu-lutea*, yellow fruited; *pendula*, drooping; and *variegata*, with silvery-marked leaves. *P. americana* seems to be a geographical form.

One of the most ornamental kinds is *P. floribunda* (a variety of *P. Malus*), with pale rose-red flowers, which assume brilliant crimson tints in the variety *atrosanguinea*. The double-flowered form (*flore-pleno* or *Parkmanni*) is a good plant, as are *Elise Rathke*, *Niedzwetzki*, and *Schiedeckeri*.

The Japanese Quince, *P. (Cydonia) japonica*, has many varieties, varying in colour from white to deep crimson from December to April. Closely related is *P. Maulei*, also from Japan, which has orange-red flowers in April, followed by fragrant orange-yellow fruits. The False Service Tree (*P. pinnatifida* or *fennica*), said to be native of the Isle of Arran, has pinnately cut leaves and white sweet-scented flowers in May and June, succeeded by scarlet fruits. The True Service Tree (*P. domestica*) has pinnate leaves, creamy-white flowers, and red pear-shaped fruits.

The Siberian Crab (*P. prunifolia*) has many charming varieties, with Cherry-like leaves, white Pear-like flowers, and yellowish and red fruits of an agreeable acidulous flavour. Closely related is the Siberian Cherry Crab (*P. baccata*). The Chinese Crab (*P. spectabilis*) has pale-red semi-double flowers in April and May; and the Wild Service Tree (*P. torminalis*) resembles *P. Aria* in appearance, but the leaves are not woolly white beneath. There are several other kinds of *Pyrus*.

**Quercus (OAK).**—There are several species of Oak, some evergreen, some deciduous, but all more or less valuable and ornamental timber trees.

Among the evergreen Oaks are the well-known Holm or Holly Oak (*Q. Ilex*), from the Mediterranean region. It is perfectly hardy in the milder parts of the kingdom, and is very variable in habit, judging by its forms, such as *crispa*, *fagifolia*, *fastigiata*, *integrifolia*, *latifolia*, *serratifolia*, &c. The Cork Oak (*Q. Suber*), *Q. acuta*, the Kermes Oak (*Q. coccifera*), *Q. agrifolia*, *Q. cuspidata*, and *Q. virens* are other evergreen kinds.

The British Oak (*Q. Robur*) is the best-known deciduous kind. It includes several varieties, including *pedunculata* and *sessiliflora*. The "Golden Oak" is a form called *Concordia*, with golden-yellow leaves; and *nigro-purpurea* has purple leaves. In the village of Polstead, Suffolk, there is said to be a British Oak 2000 years old, with a girth of 36 ft. The Valonia Oak (*Q. Ægilops*) is a semi-evergreen with a few varieties. The Turkey Oak (*Q. Cerris*) is a favourite recognized by its deeply cut leaves and bristly acorn cups. There are several varieties, including a *variegated* one, and one with very deeply cut leaves, *laciniata*. The Scarlet Oak (*Q. coccinea*), from North America, is a quick-growing tree with pinnately cut leaves about 1 ft. long, which assume brilliant-red or



Fig. 432.—*Pyrus arbutifolia*. (3.)



scarlet tints in autumn, especially in the variety called *splendens*. Sprays of foliage are largely used by florists. Another North American Oak with deeply coloured leaves in autumn is *Q. rubra*, to which may be added *Q. palustris* and *Q. tinctoria*.

With the exception of special varieties which are grafted, most Oaks are easily raised from seeds. Hundreds of thousands of the Common Oak are raised annually.

**Rhamnus** (BUCKTHORN).—Of the sixty species known, only two or three are commercially valuable. The Common British Buckthorn (*R. catharticus*), 5–10 ft. high, with ovate serrate leaves; the Black Dogwood (*R. Frangula*), with entire leaves; and *R. Alaternus*, from South Europe, with ovate-elliptic serrate leaves, are best known. There are several varieties of the last two named. The plants grow in any garden soil, and are raised from seeds, cuttings, and layers.

**Rhododendron**.—The trade in Rhododendrons is extensive, and of late years many fine garden forms have been raised. Even the commonest kinds are gorgeous when carrying their clusters of tubular or bell-shaped flowers; but those with large blooms and clear and distinct colours are naturally most appreciated, especially if they are also hardy enough to stand our ordinary winters. The now common *R. ponticum*, from Asia Minor, has proved itself so valuable, not only as stock for the grafting of the choicer varieties, but as a game-covert plant, that it is raised in enormous numbers every year from seeds. Other kinds are largely used in the same way, and all possess the great advantage that they are immune from the attacks of rabbits. In the most favoured parts of the kingdom, like Devonshire and Cornwall, many parts of Ireland, and the south-west of Scotland many of the lovely Himalayan Rhododendrons flourish as if they were indigenous. Some valuable hybrids have been raised from these.

The old idea that Rhododendrons would flourish in a peaty soil only, and in no other, no longer holds good. Nurserymen now grow them in loam as well as in peat; but the main point is to refrain from adding lime to the soil in any form, and not to plant on a limestone soil.

Amongst the Himalayan Rhododendrons hardy in the milder parts are the following: *arboreum*, white, rose, or crimson, March to May; *Aucklandi*, pure white tinted with pink; *barbatum*, crimson; *campanulatum*, pale lilac, spotted purple; *ciliatum*, reddish purple; *Dalhousiae*, white, tinged rose; *Falconeri*, white; *fulgens*, blood red; *grande*, white; *Hookeri*, deep red; *niveum*, yellowish and lilac, spotted crimson; *Thomsoni*, blood red; and others.

Some very fine hybrids have been raised from some of these species and others, the best known being *Harrisi* (*arboreum* × *Thomsoni*); *Kewense* (*Aucklandi* × *Hookeri*); *Luscombei* (*Fortunei* × *Thomsoni*); *Nobleanum* (*arboreum* × *caucasicum*), which produces its crimson flowers in January and February; *præcox* (*ciliatum* × *dauricum*); *Shilsoni* (*barbatum* × *Thomsoni*); *Wilsoni* (*ciliatum* × *glaucum*); and several others.

The best of the North American Rhododendrons include *albiflorum*, creamy white; *californicum*, rose purple; *catawbiense*, sulphur yellow, with a white variety (Cunningham's White) which is largely used as a stock; *maximum*, pale rose or white, spotted red and yellow; and *punctatum*, rose. To these may be added *R. Rhodora* (better known as *Rhodora canadensis*), a deciduous shrub, 3 ft. high, with sweet-scented purple flowers.

Amongst European species are *caucasicum*, 3 ft., rose, white inside, spotted with green; *ferrugineum*, the Alpine Rose, 1 ft., scarlet or rose red, with several varieties. Closely related is *R. hirsutum*, 1-2 ft., pale red or scarlet; *Smirnowi*, 3-6 ft., crimson purple.

Apart from the Sikkim Rhododendrons, Asia, including China and Japan, has also supplied some good kinds, such as *Anthopogon*, 1-2 ft., sulphur yellow; *Collettianum*, 8-10 ft., white; *dauricum*, 3 ft., rose, January to March; *Metternichi*, rose; *primulinum*, 1½ ft., pale yellow, &c.; *racemosum*, 1 ft., pinkish white; *yedoense*, rose pink; and *yunnanense*, 4 ft., white or pale lilac.

As to garden hybrid Rhododendrons, several thousands of kinds have now been raised, one of the first being *altaclerense* (*catawbiense* × *ponticum*), with brilliant scarlet blooms, in 1835. The range of colour is great, but ranges between pure white or blush white, pink and rose, purple, magenta, and claret, up to deep crimson and scarlet. Some three or four hundred varieties have received fancy names, and the reader is referred to the catalogues of specialists for these. Some names are to be found in all when the varieties are universally popular, and this rule applies with particular force to the exquisite "Pink Pearl", which has become so famous during recent years. Fuller details as to species, varieties, hybrids, &c., will be found in the *Practical Guide to Garden Plants* (Longmans), and in Mr. W. Watson's book on *Rhododendrons and Azaleas*.

**Rhodotypos kerrioides.**—A pretty Japanese shrub with deeply serrated leaves and white flowers in May. Increased by layers, division, or cuttings.

**Rhus (SUMACH).**—There are some 120 species in this genus, mostly shrubs or low trees, with graceful foliage, many with resinous, caustic, or even poisonous juice. *R. cotinoides* (fig. 433), the "Chittam Wood", grows 20-35 ft.

high in the United States. Its undivided leaves assume brilliant shades of scarlet and crimson suffused with yellow and orange in autumn.

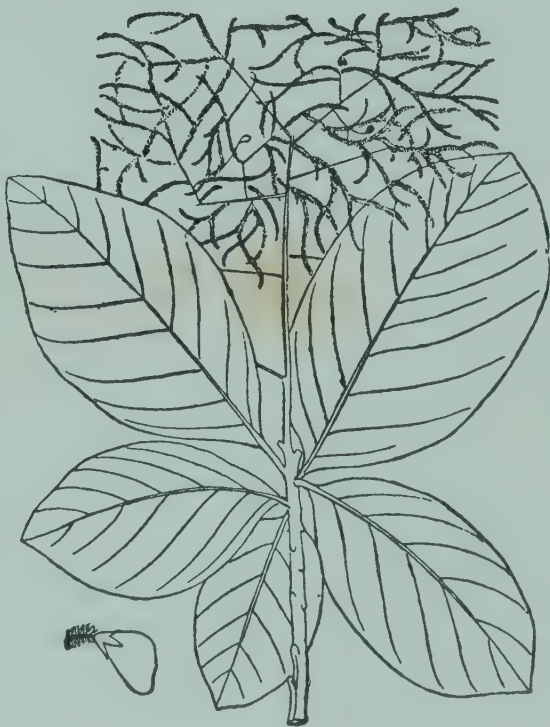


Fig. 433.—*Rhus cotinoides*



The South European *R. Cotinus*, the Smoke Tree, Wig Tree, or Venetian Sumach, is somewhat similar, but is much more common. It has roundish leaves, and is remarkable for the cloudy masses of feathery flower stalks in autumn. There is a drooping variety, *pendula*, and a deep-purple-coloured one, *atropurpurea*. *R. glabra* has long pinnate leaves, which become red or scarlet in autumn. The variety *laciniata* has deeply cut leaflets. *R. Osbecki*, also with pinnate leaves, has the midrib winged on each side. The North American Stag's-horn Sumach (*R. typhina*) grows

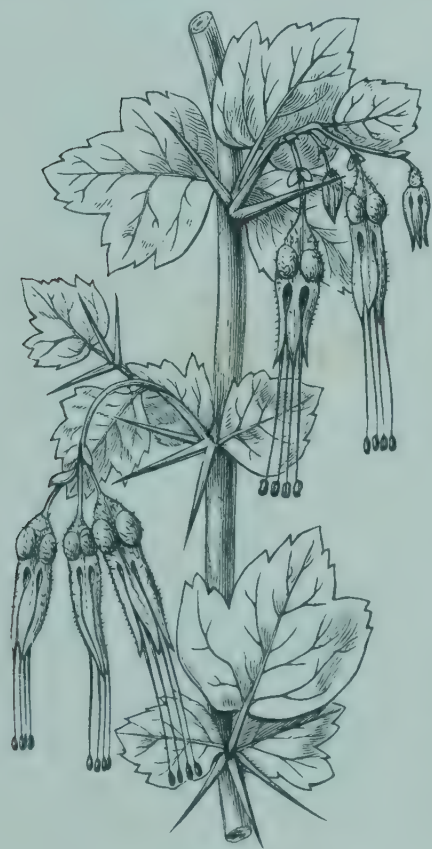


Fig. 434.—*Ribes speciosum*

up to 30 ft. high, and has hairy pinnate leaves, the rachis and main veins of the leaflets being covered with velvety-brown hairs. There are other species, like *Michauxi*, *succedanea* (rather tender), and *vernificera*, the Japanese Lacquer or Varnish Tree; and to them must be added the poisonous North American species (*R. Toxicodendron* and *R. venenata*), the foliage of which is ornamental but dangerous.

**Ribes (CURRANT).**—The best-known flowering kinds are *aureum*, 3–8 ft. high, golden yellow; *sanguineum*, the well-known North American “Flowering Currant”, of which there are several varieties, like *albidum*, white; *atro-rubens* or *splendens*, deep crimson; *atrosanguineum*, deep blood red; *flore pleno*, double crimson. *R. speciosum* (fig. 434), the Fuchsia-flowered Currant, is a prickly shrub with deep-crimson flowers. *R. Gordonianum* is a hybrid between *aureum* and *sanguineum*. All kinds flourish in good garden soil, and may be raised from cuttings or seeds.

**Robinia.**—Quick-growing Acacia-like trees, with graceful pinnate leaves and clusters of pea-like flowers. *R. hispida*, the Rose Acacia, grows up to 15 ft. high, and has the young branches covered with bristly hairs. The flowers are rosy pink. *R. neo-mexicana* is not yet well known. It has the young leaflets covered with brownish hairs, and bears deep-rosy flowers. *R. Pseud-acacia*, the False Acacia, is the best-known species. It grows up to 60 ft. high, and has graceful foliage and white flowers. There are several varieties, including *Bessoniana*, largely grown as a mop-headed tree; *Decaisneana*, bright rose-pink flowers; *inermis*, without thorns. *Pyramidalis*, *macrophylla*, *angustifolia*, and many other names are given to express certain peculiarities. *R. viscosa*, 20–40 ft. high, has clammy young shoots and rose-coloured flowers. The kinds mentioned are natives of North America. They flourish in ordinary garden soil, and are easily raised from seeds. Special varieties, however, are grafted on stocks of the common kind.

**Rose.**—Besides the garden varieties of Roses there are now many

natural species in which a trade is done. These include the Sweet Brier (*R. rubiginosa*) and the many lovely varieties of "Penzance" Briers that have been raised by crossing it with the garden varieties. The Japanese Rose (*R. rugosa*), readily distinguished by its deeply veined leaves, large single or semi-double white or deep magenta-coloured flowers, exceedingly spiny stems, and large brilliant crimson "hips" or fruits in winter. The Polyantha Rose (*R. multiflora*), from which the popular Crimson Rambler has been derived, and *R. Wichuraiana* (fig. 435), both natives of China and Japan, are the parents of two vigorous families of climbing garden Roses that sell freely. The Common Dog Rose or Brier (*R. canina*) is valuable not only as a hedge plant and for its lovely flowers, but also as a valuable stock for the choicer garden Roses. *R. indica* is the China Rose, from which numerous hybrids have been raised. The Austrian Briers (*R. lutea*), with yellow flowers; the Ayrshire Roses (*R. arvensis* or *repens*); *R. pomifera*, with large deep-crimson fruits; *R. sempervirens*, the Evergreen Rose; *R. setigera*, the North American Prairie Rose; and the Scotch Rose (*R. pimpinellifolia* or *spinosissima*) are species in which a certain amount of trade is done; but there are many others, including the almost thornless Banksian Rose from China (*R. Banksiae*).



Fig. 435.—*Rosa Wichuraiana*. ( $\frac{1}{2}$ .)

ROSES FOR PROFIT.—The trade in plants and flowers to-day is enormous. Hundreds of nurserymen in the British Islands, on the Continent, and in America are busily engaged not only in propagating hundreds of thousands of plants annually by budding and grafting and from cuttings, but also in raising new varieties by cross fertilization and hybridizing. For many years past the French growers had the monopoly, or at least the lead, in the latter business; but English, Irish, and Scotch rose-growers have risen to the occasion of late years, and have produced some charming and commercially valuable varieties. The trade done by the nurseryman and raiser is of course mainly for the more or less wealthy amateur, for the small householder, and for the villa resident who dearly loves to have a blossom, of his own growing, in his buttonhole when going to business in the morning. Hundreds of men are engaged in the industry, especially during the budding season, when thousands of dwarfs, standards, and half-standards and weeping Roses must be "worked" in the space of a few weeks. This work has given rise to the other industry of pro-



ducing the stocks—chiefly the Brier and the Manetti—which must be raised in hundreds of thousands from seeds or cuttings and be ready at the proper period to receive their choicer burdens. In addition to these, men who are not rose-growers at all, or even gardeners, find brief employment in the autumn in ransacking hedges for the clean straight stems of the Dog Rose, which they cut out and sell to the nurseryman, occasionally trying to dispose surreptitiously of Blackberry stems in the bundles. The nurseryman who propagates thousands of Roses every year for sale, and who often spends large sums of money in advertising and in printing catalogues, must naturally deal with hundreds of varieties that are unknown to the man who grows Roses simply to produce a supply of cut flowers in the open air or under glass. The nurseryman must be prepared to supply any and every variety asked for by his fastidious customers: the marketman contents himself with growing only those varieties that experience has taught him will sell in large quantities, and will cost as little as possible to produce. Fortunately the fashion in Roses shows no signs of decrease, notwithstanding the competition from other fine flowers; and it may be safely said that there are thousands of plants and blossoms sold to-day where only dozens were sold twenty years ago. What becomes of the enormous number of plants raised and sold every year goodness only knows; but it would be a bad day for the grower if his customers had only a tithe of his cultural skill.

It is difficult to arrive at any very definite estimate as to the expenses and receipts of the rose-growing industry, as there are so many factors in the case. To secure the best results the land must be of that type known as a rich and rather heavy loam, and such land may be not only higher in price, but also cost more to bring into fine condition, than a soil of a different nature. Still, it cannot be gainsaid that the growing and raising of Roses is a fairly profitable business. Good rose-growing soil may be rented on reasonable terms from £2 or £3 to £10 per acre, according to circumstances, and a man may raise from 5000 to 10,000 plants annually upon such an area. His total expenses, apart from living and house rent, may vary from £60 to £90 a year per acre in the case of the "small" man who does a local and costermonger trade, to as much as £100 to £150 per acre in the case of the big grower who advertises extensively, issues elaborate catalogues, and who makes a point of exhibiting at every show worthy of note. But it matters little whether the actual expenses be great or small so long as a reasonable profit can be made on the outlay; and as a rule large sums of money spent wisely generally bring back greater returns in proportion than small sums spent in the same way. But injudicious spending will soon lead the big or little man to the bankruptcy court.

Apart from the nurseryman, who mainly grows for private individuals, and the florist who grows his plants in pots under glass, the market gardener also in many cases undertakes the culture of Roses.

He grows just a few varieties on a large scale in the same way that he grows Gooseberries, Currants, or Raspberries. It is not unusual to see hundreds, if not thousands, of such kinds as *Général Jacqueminot*, *La France*, *Baroness Rothschild*, *Mrs. John Laing*, *John Hopper*, *Liberty*, *Richmond*, *Ulrich Brunner*, &c., planted out about 2 ft. apart every way beneath standard or half-standard fruit trees simply for supplying cut flowers during the summer and autumn months. The cultivation given is often of the roughest description, just the same as accorded to Gooseberries, Currants, and Raspberries. The ground is dug about once a year, hoed about once or rarely twice a year, and the plants are so-called pruned by labourers who are often paid by piecework; they prune so many bushes by the 100 or 1000 for so much in the same way that Gooseberry bushes are often cut. Needless to say, this method of Rose culture, owing to its very cheapness, produces poor results. Half the number of plants, properly cultivated and pruned, would yield three and four times the quantity of better flowers. In these days of keen competition the best flowers—not necessarily the choicest and rarest varieties—sell best; and second- and third-rate stuff must wait till the markets are cleared, and then perhaps they will only fetch the lowest prices that dealers will condescend to give. The unfortunate and short-sighted grower must either accept the price offered or throw his goods away, as they will probably not pay for carriage home again.

The trade in Rose blooms is going on nearly the whole year round in some way or another, either in home-grown material or in the flowers that come in from the Riviera. The foreign flowers, however, rarely interfere with the home-grown products, as they come in just between the seasons, and enable the florists to maintain a good supply for their customers.

The blooms are used for all kinds of things and in all sorts of ways—for table and house decorations, banquets, and public functions of all kinds, coat flowers and sprays, wedding bouquets, and funeral emblems of every description. Even the poorest people will buy a Rose from the street sellers when they will not look at any other flower. Thus everyone, rich and poor alike, is the Rose-grower's friend.

PROPAGATION OF ROSES.—This business is commercially in the hands chiefly of nurserymen, although not a few market gardeners and private individuals also indulge in it. The stocks principally used by British growers are the Manetti and the Brier or Dog Rose, but the Bour-sault, de la Grifferæ, the Celina, and *rugosa* are others used, often by Continental growers; and plants are grown as bushes, half-standards and standards. As a rule most of the Tea Roses and Hybrid Teas are worked on the Brier Stock, while most of the Hybrid Perpetuals are budded or grafted on the Manetti stock. The stocks themselves are usually raised from cuttings, but the Brier stock is often raised from seeds—thus producing the seedling Brier stock that some favour so much and others just as strongly dislike.



The cuttings for bush Roses are made about the end of October, 6 to 9 in. long, from well-ripened shoots of the current year's growth. They are all "eyed"—that is, all the buds are removed except two or three at the top—the object in view being to prevent as far as possible the development of suckers from the wild stock. The cuttings are planted vertically, 3 or 4 in. from each other, in rows about 1 ft. apart, and are buried about three-fourths of their length, the soil being pressed



Fig. 436.—Showing how Rosebuds are detached at the Dotted Lines shown on the Inverted Shoot

The leaves are cut away at *a*, leaving a short piece of stalk as at *b*. The dormant bud is shown at *c*; at *d* is a bud ready for insertion, the dotted lines showing portion cut away.

firmly about them with the feet. The best time for putting in cuttings is about the last week in October, but they may be inserted also during November in mild open weather.

Many of the choicer Roses, including all the *Wichuraiana* and *Polyantha* section, and many others are raised from cuttings in the same way as *Manetti* and *Brier* stocks, but are not "eyed", and thus "Roses on their own roots" are readily secured.

The cuttings of *Brier* and *Manetti* are left in the soil until the following October and November. They are then transplanted 6 to 9 in. apart in rows about 2 ft. asunder, so as to be ready for budding in the open

air the following summer. The soil is drawn up in ridges round the base of the stocks. The soil, however, is removed prior to budding, and the basal portion of the stems, having been surrounded with the moist soil, are much more easily "worked" than those that have been left exposed to the weather during the season.

For standard and half-standard Roses the Brier stock is always used, and stems as clean and straight as possible are selected for the purpose. Half-standards are about 3 ft. high; and standards vary from 6 to 9 ft. or more high, the tallest stems being used for the budding of weeping varieties with long shoots, such as the Dorothy Perkins class and others. The stocks are planted in October and November about 1 ft. apart in rows about 2 ft. apart, and to prevent them being blown over by the wind they are often strung together with twine for mutual support. These standard and half-standard stocks rarely have any fibrous roots attached. They are therefore planted deeply and firmly, and by the following July one or two of the best shoots near the heads are reserved for the insertion of the buds.

**BUDDING ROSES.**—In the open air this may be done from the end of July up to the end of September almost —the later date being preferable after a hot and rainless summer. Expert budders know exactly the best buds to select from the shoot of any particular variety, avoiding naturally those that are too young and sappy, or too old and already beginning to sprout, as shown in fig. 442 at *a*. Consequently the most likely buds are generally obtainable from the centre of the ripened shoot of the current year's growth.

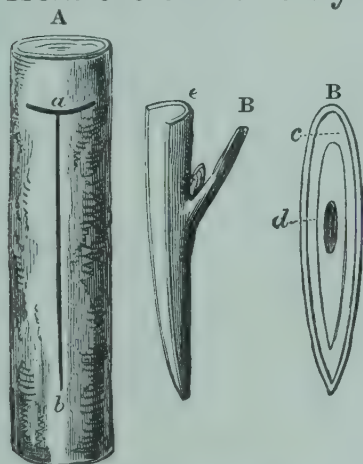


Fig. 437.—Shield-budding or T-budding

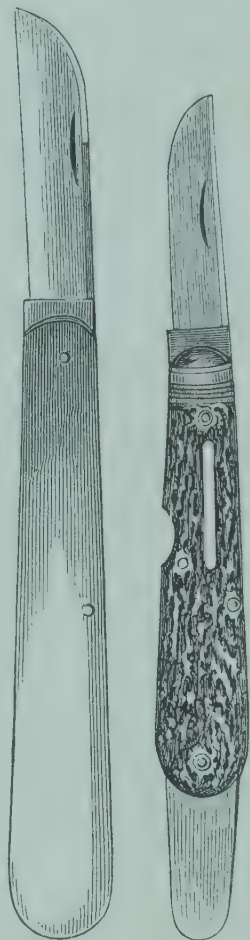


Fig. 438.—Budding Knives

The method of budding usually practised is that known as "T-budding" or "shield-budding". This is shown in the annexed diagram, fig. 437, in which A represents the stock and B, B the bud with a shield-like piece of bark attached. The shoot is held upside down in the left hand, and after the leaves have been removed, with the exception of a small piece of the stalk, as shown in fig. 436, *a*, *b*, the bud is cut out and temporarily placed between the lips. A transverse slit is then made in the stock A, as shown at *a*, with the budding knife (specimens of which are shown in fig. 438), and a vertical cut about 1 in. long is made upwards to meet it as shown at *b*, this forming the letter T, from which the name arises. The bud B, which has had its tail of bark cut across straight as shown at *e*, is then inserted at *a* and pushed down



towards *b*—the bark having been previously raised and opened a little with the bone handle of the knife. The diagram to the right shows the layers of bark, cambium (*c*) and wood with the base of the bud *d* in the centre. If a thin strip of wood adheres to the bud when first

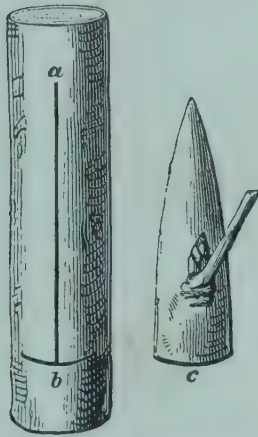


Fig. 439.—Inverted T-budding

cut from the shoot it may be easily removed by a slight bend and a twitch with the point of the knife blade between finger and thumb. Care, however, is taken in removing this plant not to bring the core of the bud with it. Should this happen, as it sometimes does, the bud is useless. Another method of budding is shown at fig. 439, called inverted T-budding, but it is rarely or never practised in British nurseries, although it has advocates on the Continent. Fig. 440 shows how the buds are inserted and tied on the upper shoots of a standard or half-standard stock.

GRAFTING ROSES.—Thousands of Roses are grafted under glass each year between January and March, both on the Brier and Manetti stocks, for the trade in pot Roses. The stocks are lifted from the open and placed in a genial warm light soil a few weeks in advance of the budding season. The increased warmth excites the flow of the sap in the stocks, and once this is secured they may be budded at once. The kinds to be grafted must also have been started into growth

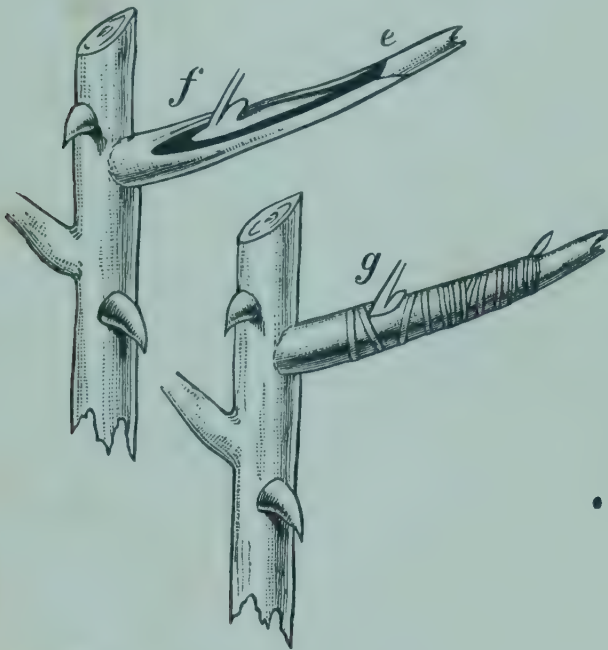


Fig. 440.—Budding Standard Brier Shoots

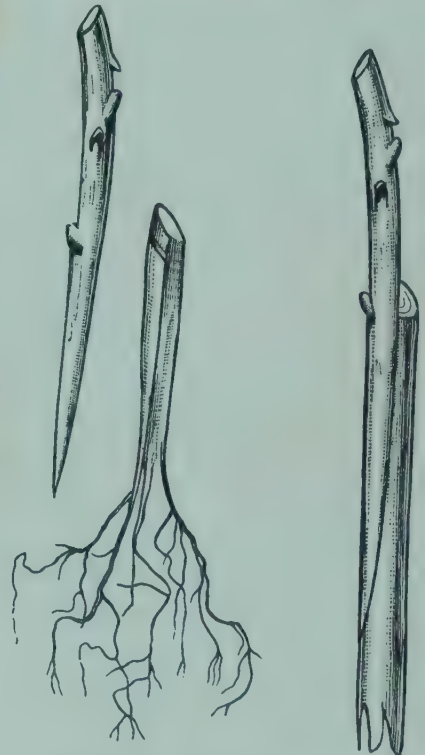


Fig. 441.—Side Grafting Roses

in gentle heat to bring the sap into motion and thus secure the quicker union of the cambium layers in both stock and scion. Fig. 441 shows a piece of rooted Rose stock with the scion on the left, and on the right how they are placed together, at least one edge flush with the other, before being tied up with raffia. This is known as side grafting, and differs

somewhat from the method of fruit-tree grafting in not having a tongue cut in either stock or scion. As a rule no grafting wax is used when Roses are being grafted under glass, but under certain conditions it is used to ensure success. In any case, when the scions have been properly attached and tied to the rooted stocks the latter are potted in rich gritty soil in small pots and are placed in a frame with a bottom heat of  $65^{\circ}$  to  $70^{\circ}$  F. They are kept close and moist for a few days, after which more air and light are gradually admitted. When firmly established the plants are taken out of the frame and placed in 5-in. pots, a good rich loamy compost being used. About the end of May they are transferred to the open air and plunged in ash beds, where they are watered and attended to during the summer until fit for sale from October onwards.

When weeping and climbing Roses are raised under glass they are often trained up beneath the rafters on a trellis, much in the same way as Vines, and in this way shoots from 15 to 20 ft. are developed in the course of one season. In late summer or autumn these long-shooted Roses are placed outside to ripen thoroughly, the shoots being trailed over the glass of the houses.

**PROPAGATION BY EYES.**—Besides budding and grafting, and cuttings of the ripened shoots in October and November, Roses may

also be propagated during the summer months from eyes. These are selected from mature shoots of the current year, and those near the base showing signs of sprouting are selected. They are detached as if for budding, but a pair of basal leaflets are allowed to remain. The buds are then inserted in moist sandy soil, and kept close and shaded for some time, until roots are emitted, after which they may be given plenty of light and air, and in due course be potted up. Fig. 442 shows how the cuttings from eyes are made.

**VARIETIES OF ROSES.**—Although there are thousands of varieties of Roses mentioned in trade catalogues, it would be a great mistake for the market grower, or the seller of plants only, to attempt to stock the lot. Some varieties sell much better than others, and the tradesman must grow in bulk those he finds from experience are likely to remain as short a time as possible in his nursery. It does not follow that a variety that wins a gold medal at an exhibition is the one that will sell best, and the shrewd grower waits until his customers worry him a little for any

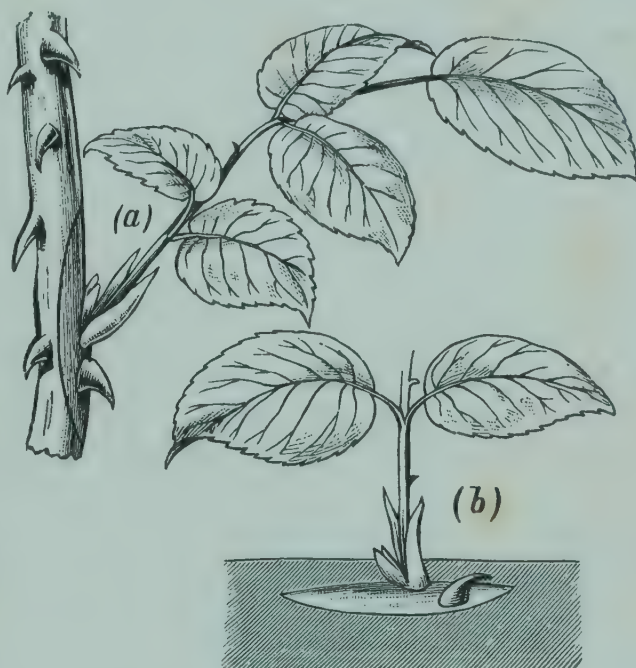


Fig. 442.—*a*, Rosebud selected for Propagation. *b*, Mode of planting the Bud.



particular sort before he propagates it in large numbers. Of course he will use his discretion in all cases. The following "Hybrid Perpetuals" nearly always sell well: *Abel Carriere*, *Baroness Rothschild*, *Ben Cant*, *Capt. Hayward*, *Chas. Lefebvre*, *Duke of Connaught*, *Duke of Edinburgh*, *Duke of Wellington*, *Fisher Holmes*, *Frau Karl Druschki*, *General Jacqueminot*, *J. B. Clarke*, *Louis Van Houtte*, *Mrs. J. Laing*, *Marie Baumann*, *Madame Gabriel Luizet*, *Mrs. R. G. Sharman-Crawford*, *Prince Camille de Rohan*, *Ulrich Brunner*, *Susanne Marie Rodocanachie*.

The best-selling "Hybrid Teas" include: *Betty*, *Countess of Derby*, *Countess of Garford*, *Caroline Testout*, *Dean Hole*, *Earl of Warwick*, *Edu Meyer*, *Grüss an Teplitz*, *Hugh Dickson*, *Kaiserin Augusta Victoria*, *Lady Ashtown*, *Lady Battersea*, *Liberty*, *Madame Abel Chatenay*, *Madame Ravary*, *Prince de Bulgaria*, *Richmond*, *Killarney*, *Viscountess Folkestone*.

Among "Tea Roses" proper the following sell well: *Catherine Mermet*, *Ethel Brownlow*, *Madame Berard*, *Madame Lambard*, *Maman Cochet*, *Madame de Watteville*, *Étoile de Lyon*, *Francisca Kruger*, *Gloire de Dijon*, *Jean Ducher*, *Madame Caroline Kuster*, *Madame Eugenie Verdier*, *Madame Margottin*, *Perle des Jardins*.

Among the "Polyantha" or "Multiflora" kinds *Crimson Rambler* holds the premier place for a climbing rose, and is closely followed by *Dorothy Perkins*, *Hiawatha*, *Lady Gay*, and others among the "Wichuraiana" group. One of the most popular of the dwarf Polyanthas is *Jessie*, which is largely grown for market and for bedding out during the summer months. It has profuse masses of bright cherry-crimson blossoms.

To the above must be added various Moss Roses, China or Monthly Roses.

ROSES IN POTS FOR MARKET.—Prior to the coming of *Crimson Rambler* and that greater following of varieties more or less nearly allied, and of which this popular sort proved to be the forerunner, Roses in pots for market work were in the minority indeed, and were but rarely seen. Now and again a few belated examples put in an appearance in the market, their sorry condition—ill-groomed and dusty of leaf—telling its own tale. Such was the "standard" of pot-grown (or starved) Roses in leading flower markets twenty or twenty-five years ago.

To-day all this is changed, the grower of repute realizing that it is quality that tells and that to succeed he must of necessity stand in the front rank of such men. Hence in springtime from April onwards pot-grown Roses of the Rambler and Wichuraiana classes practically dominate the scene, the plants of from 6 to 8 ft. in height festooned with flowers, and constituting veritable shower bouquets that carry conviction at a glance. The specialists in these bring their produce to market in specially constructed vans, the plants being grown and trained as pyramids in columnar fashion, or, in the case of those of drooping habit, as tall or half-standards, and which in certain phases of indoor decoration are of the highest possible value and ornament. The whole subject, indeed, resolves itself into a question of demand and

supply: it may be this or the same conditions in reverse order, viz. supply *creating* the demand. Be it what it may, the demand for this class of goods is unmistakable, for never in the history of flower-growing for market have floral and allied decorations been carried out on so lavish a scale as at the present time. Obviously, then, the demand exists, and the grower who would be up to date in such matters must be up and doing also.

PREPARING THE PLANTS.—From what has been said of trained specimens and the like it should be clear that a season or more of preparation is required before the plants are in a condition for forcing, or even capable of producing a representative display of flowers. This indeed is true, and of necessity the initial expense, where the plants are grown on a large scale—whether as concerns the purchase or the creation of stock, the cost of pots, or cultural care and attention during the waiting months—is very considerable. This much of course has to be faced, the cost to be regarded as an essential in the case, a necessary part of the equipment of a plant-growing concern.

Of primary importance in all pot-grown Roses is that of established plants, and that kind of establishing in particular which is responsible for a smaller and more concentrated growth as opposed to the greater grossness of the plants when these are grown in the open ground. Now there are two ways of raising stock, viz. summer budding on to stocks already in the open ground, and grafting or budding on to stocks under glass during the winter season or the early months of the year. Each of these methods has its own advocates, and the twain are capable of advantageous adoption by any who will. The indoors budded or grafted plants will require to be liberally dealt with from the first, to encourage the production of those radical growths or “rods” so essential to a good flowering. It is in plant-growing affairs a species of foundation-stone laying, and the work must be well and truly done if the superstructure subsequently to be raised thereon is to play a successful part. For this portion of the work a year or more will be required, the plants in all circumstances to be grown in the fullest light and to receive every possible attention.

TEAS AND HYBRID TEAS, when pot-grown, may be flowered in a few weeks or months from the graft, and may be greenhouse-grown from the start. It is of course not advised that these youthful plants be allowed to distress themselves by a too early flowering; rather should this be discouraged, so that the plants can make greater headway. The first growths are not infrequently poor and insignificant, so much so that it is a good plan when they have become fairly mature to prune them back to their base to encourage a stronger break. The subsequent treatment of this section is thinning rather than pruning as ordinarily understood, though hard pruning may be indulged in when the plants have become ungainly or even overcrowded with shoots.

HYBRID PERPETUALS.—The true “perpetual” flowering Roses of those we have named is the Tea or Hybrid Tea, the varieties of the present



group being rarely so. These, like those of the Rambler class, require a season of preparation before reaching the useful flowering stage, though in a lesser degree than the Ramblers. In a few instances, and where the plants are of good size and well rooted, the maidens may be permitted to flower in the spring following the potting up, though the quality of the flower in no sense compares with that afforded by the more-established example.

POTTING UP MAIDENS.—There is no time in the year to equal the first half of October for potting up all maiden plants from the open ground. At the time stated the new root fibres are most active, and the plants quickly take to the fresh soil. Even where the plants cannot be immediately potted it were better to lift them and heel them in, so that the formation of the new root fibres is retarded.

Hybrid Perpetuals are best potted annually at about the same period, whilst Teas and Hybrid Teas, being more continuous in shoot and root production, and being required for autumn and winter work, should be repotted or topdressed as required in August or September. Good loam, with well-decayed horse dung and a little blood and bone manure, is all that the Rose requires. Highly concentrated manures in the hands of the inexperienced may be a source of considerable danger, and are not to be trifled with.

TEMPERATURES AND MILDEW.—These are not infrequently first cousins. Aided by the constant use of the syringe and the stuffiness of the houses mildew will spread like wild-fire. A drier overhead method of treatment, freer ventilation, the abolition of the syringe, and, finally, little or no mildew. For early winter forcing, start the plants in a temperature of 45° F. and increase to 55° F. for Hybrid Perpetuals and to 60° F. for Hybrid Teas about six weeks later.

LONG-STEMMED ROSES.—Pot-grown Roses for market represent but one phase of the subject, and thousands of long-stemmed Roses result from planted-out specimens. These, however, cannot be started into growth so early as pot-grown plants, and are best when given a much slower treatment from the start. This applies to the Hybrid Perpetual class more particularly, and always to those in beds at ground level, as opposed to those on raised beds or benches receiving the benefits of the applied heat.

POPULAR VARIETIES.—Were I asked to name the most popular of market Roses I should say, without hesitation, *Madame Abel Chatenay*, in addition to which one might take *Niphetos*, *The Bride*, *Bridesmaid*, *Catherine Mermet*, *Sunrise*, *Liberty*, and *Richmond*. Of late the apricot-yellow *Lady Hillingdon* has appeared upon the scene and it is simply ideal for early work. The Hybrid Perpetuals would, of course, include *Captain Hayward* and that lovely old and fragrant rose, *General Jacqueminot*. A set of varieties indispensable for long stems should include *Joseph Lowe*, *Frau Karl Druschki*, *Captain Hayward*, *Mrs. J. Laing*, and *Ulrich Brunner*.

[E. H. J.]



**Rosmarinus officinalis** (ROSEMARY).—A popular South European shrub, 6–8 ft. high, with narrow grey-green leaves, whitish beneath, and spikes of whitish or pale-purple flowers. It grows well in ordinary soil in warm sheltered spots, and may be raised from cuttings, layers, or seeds. The oil is much used in perfumery.

**Rubus** (BRAMBLE).—Only a few of the 100 species of Bramble are dealt in commercially. They are mostly of climbing or trailing habit, and require the support of stakes, &c., but there are a few shrubby or bushy kinds. One of the best of the latter is *R. spectabilis*, from North America, 6–10 ft. high, with tri-foliolate serrate leaves, and deep rose-purple flowers in April. *R. biflorus* (often called *leucodermis*) has conspicuous white stems. *R. deliciosus* (fig. 443) has white flowers and Currant-like leaves. *R. phœnicolasius* is the Japanese Wineberry, with pink flowers and masses of delicious scarlet fruits. *R. laciniatus*, with ornamental deeply-cut leaves and white or rosy flowers, is worth growing for its fruits alone. The Common Blackberry (*R. fruticosus*) is valued more as a fruit than as an ornamental shrub.

**Ruscus aculeatus** (BUTCHERS' BROOM).—A native evergreen plant with flattened leaf-like branches or cladodes (see Vol. I, p. 41) that bear the small greenish-white flowers, which in the female plants are followed by bright-red (or rarely yellow) berries. *R. Hypoglossum* grows up to 18 in. high; and *R. racemosus* (*Dancea Laurus*), the Alexandrian Laurel, is a fine Portuguese evergreen, 3–4 ft. high, with glossy dark-green "foliage". These plants grow well beneath tall deciduous trees and in shrubberies in any garden soil, and are increased by layers, suckers, or seeds. Artificially dyed sprays are used in floral work.

**Salix** (WILLOW).—All the Willows are valuable ornamentally and economically, and possess the advantage of growing well in almost any soil, although they prefer a moist loam to develop thoroughly. The White or Huntingdon Willow (*S. alba*), a moisture-loving species, is well known on account of its silky white leaves. The variety *cœrulea* probably produces the finest cricket-bat wood known; while *vitellina*, with yellow- and red-barked forms, supplies the Golden Osiers. The Crack Willow or Withy (*S. fragilis*) grows up to 90 ft. high, and has narrow glossy leaves. The timber is good for cricket bats. The Bedford Willow is a form known as *Russelliana*. The Goat Willow or Sallow (*S. Caprea*) is a shrubby plant with roundish wrinkled leaves. The small plants furnish the "Palms" for Palm Sunday, and the Pussy Willows of school-boys. The variety *pendula* is the "Kilmarnock Weeping Willow". *S. pentandra*, 20 ft., with broad smooth glossy leaves, is the Bay Willow;



Fig. 443.—*Rubus deliciosus*. (½.)



*S. incana* or *rosmarinifolia* has narrow Rosemary-like leaves; *S. viminalis*, when cut down every year, provides the osiers from which the bushel and half-bushel baskets used by market gardeners and others are made; and the well-known Weeping Willow is *S. babylonica*. Willows of all kinds are easily raised from cuttings, but also from seeds. The weeping kinds are grafted on standards of the commoner kinds.

Certain species of Willows, like *aurita*, *herbacea*, *lanata*, *Myrsinites*, *reticulata*, *nigricans*, and *repens*, are dwarf and creeping in habit, and are useful rock-garden plants.

**Sambucus nigra** (ELDER).—This well-known ornamental British tree, with very pithy wood, gracefully cut leaves, and flat trusses of pure-white flowers, has many varieties, of which *laciniata*, with very deeply cut leaves, and *aurea*, the "Golden Elder", with golden foliage, are the best. There is also a silvery variegated form, and another (*leucocarpa*) with creamy-coloured instead of deep-purple berries. The common kind is easily raised from seeds and grows in any soil. Special varieties are grafted on it. *S. racemosa*, 10–20 ft., has scarlet berries and graceful foliage.

**Santolina Chamæcyparissus** (COTTON LAVENDER).—A greyish-white composite, 2–3 ft. high, with very narrow leaves, and globular heads of yellow flowers in June and July. It grows in any poor soil almost, and is increased by cuttings.

**Skimmia**.—A genus of dwarf evergreen shrubs with leathery shiny leaves, and small white fragrant flowers, followed by red berries. The best-known kinds are: *S. Fortunei* (often called *japonica*), and *S. japonica*, with a small (pollen-bearing) form known as *fragrans*, and a female (seed-bearing) one, *oblata*. Increased by cuttings in sandy soil in frames, and by layering.

**Sophora japonica**.—A fine Japanese deciduous tree, 40–50 ft. high, resembling the False Acacia (*Robinia*) in appearance, with its deep-green pinnate leaves and creamy-white flowers. There is a weeping form, *pendula*, which is grafted on the common one. *S. tetraptera* (also known as *Edwardia*) is a handsome New Zealand tree with small leaflets and trusses of deep golden-yellow flowers in summer. It is only hardy in the mildest places. The variety *microphylla* has smaller leaflets.

**Spartium junceum** (SPANISH BROOM).—An ornamental South European shrub, 6 ft. high, with twiggy stems and large bright-yellow Pea-like flowers in late summer. It grows in any soil almost, and may be increased by seeds or cuttings. There is a variety with double flowers.

**Spiræa**.—There are nearly forty species of shrubby *Spiræas*, all beautiful when in bloom, and all easily grown in ordinary garden soil. They are raised chiefly by cuttings of the ripened wood, the sturdier kinds in the open air, the more tender ones in cold frames. Seeds may also be sown when ripe, or in spring. Two colours—white and rose—predominate, and the flowering period commences as early as March and ends about August.



5  
A FEW GOOD MARKET PLUMS  
1. Gisborne.    2. Orleans.    3. Tzar.    4. Victoria.    5. Greengage.





**WHITE-FLOWERED SPIRÆAS.**—*arguta*, 3–4 ft., May; *betulifolia* (*corymbosa*), 1–2 ft., June; *bracteata* (*media rotundifolia*), 5–6 ft., summer; *cana*, 1–2 ft., summer; *cantonensis* (*Reevesiana*), 3–4 ft.; *chamædrifolia*, 2–5 ft., with a few varieties; *decumbens*, trailing, 6–12 in.; *discolor* (*ariæfolia*), 6–10 ft.; *fissa*, 6–8 ft.; *gracilis*, 2–3 ft.; *hypericifolia*, 4–6 ft., with several varieties like *acuta*, *Besseriana*, *crenata*, *thalictroides*, &c.; *Lindleyana*, 8–12 ft.; *media* (*confusa*), 2–4 ft.; *Millefolium*, 4–6 ft.; *prunifolia*, 4–5 ft., with a pretty double-flowered variety, March; *pubescens* (*chinensis*), 2–3 ft., March; *sorbifolia*, 3–6 ft.; *Thunbergi*, 1–3 ft., March; *trilobata*, 1–3 ft.; *Van Houttei*, 5–8 ft. *S. Aitchisoni*, with pinnate leaves and masses of white flowers, is a fine plant, not yet well known.

**ROSE-FLOWERED SPIRÆAS.**—*bella*, 3–4 ft.; *bullata* (*crispifolia*), 1–2 ft.; *Douglasi*, 3 ft.; *japonica* (*callosa*, *Fortunei*), 1–3 ft., with several varieties, including *Bumalda*, and its deep-rose sub-variety “Anthony Waterer” (fig. 444); *alba*, white; *splendens*, *ruberrima*, &c. (this species must not be confused with the herbaceous plant popularly known under the same name. See Vol. II, p. 206.; *Nobleana*, 3–4 ft.; *salicifolia*, 3–5 ft.; *tomentosa*, 3 ft. Many of the above are grown in pots and forced into early bloom under glass.

**Staphylea colchica** (BLADDER NUT).—A distinct Caucasian shrub, 4–5 ft. high, with serrated leaflets and erect branching racemes of white flowers. *S. pinnata* (Job’s Tears; St. Anthony’s Nuts), 6–12 ft. high, produces its white flowers in May, followed by roundish white nuts in a bladdery capsule. These two species are largely grown in pots and are forced into early flower under glass. Other species are *Bolanderi*, *Bumalda*, and *trifolia*. A fine hybrid, called *Coulombieri*, has been raised between *colchica* and *pinnata*. Staphyleas grow in ordinary good garden soil in sheltered spots and are raised from cuttings of the ripened shoots, layers, suckers, and seeds.

**Symphoricarpos racemosus** (SNOWBERRY).—A strong-growing shrub, 4–6 ft. or more high, with oval leaves and loose spikes of small funnel-shaped pinkish flowers from July to September, succeeded by large white berries. *S. occidentalis* (the Wolf Berry) and *S. vulgaris* (or *orbiculatus*) are other species—all natives of North America, and useful in any rough soil. The last-named has a variegated form. They are all easily raised from suckers.



Fig. 444.—*Spiræa japonica* A. Waterer



**Syringa** (LILAC).—Apart from the many lovely garden varieties and hybrids of the Common Lilac mentioned below there are a few natural species in which a trade is done. Amongst these may be mentioned *S. amurensis*, 5–6 ft. high, from China and Japan, with broadly ovate leaves and dense rounded trusses of creamy-white flowers; *S. chinensis* (*dubia*, *rothomagensis*), 4–6 ft. high, with ovate lance-shaped leaves, and deep-violet flowers, supposed to be a hybrid between *persica* and *vulgaris*. *S. Emodi*, 6 ft. high, from the Himalayas, has large broadly elliptic or ovate leaves, and purple or white flowers; there is a variegated form. *S. japonica* (fig. 445) attains a height of 30 ft. in Japan, and has pale-red bark, broadly ovate leaves, and white flowers in panicles 1 ft. or more



Fig. 445.—*Syringa japonica*

long. *S. Josikœa*, 5–10 ft. high, from Hungary, has elliptic lance-shaped wrinkled leaves, and produces its bluish-purple flowers later than other species. *S. oblata*, with purple, and *S. pekinensis*, with white flowers, both come from China. *S. persica*, the Persian Lilac, grows 4–7 ft. high, and has small lance-shaped leaves and bluish-purple flowers, but has also a white-flowered variety, *alba*, and a rosy one, *rubra*.

*S. vulgaris*.—This is the common Lilac or “Pipe Tree” of North Persia, whence it has spread all over the temperate regions. The type grows up to 20 ft. high, and has heart-shaped leaves and lilac-

purple or white flowers. There are many varieties, single and double flowered, in cultivation, of which the following may be noted:—

*Single, White*: *alba grandiflora*, *alba virginalis*, Marie Legraye, Florent Stepmann, Reine Elizabeth, Mme Moser.

*Double, White*: Mme Lemoine, Mme Abel Chatenay, Princess Clementine, Miss Ellen Willmott, Mme Casimir Perrier.

*Single, Coloured*: E. Lemoine, La Tour d’Auvergne, Leon Simon, Souv. de L. Späth, Virginité, Charles X, Louis Van Houtte, Dr. Lindley, Philemon, Géant de Batailles, Gloire d’Angers, Leon Mathieu, Leopold II, Macrostachya, Roi Albert, J. D. Messemalker, President Massart, Jacques Callot, Ville de Troyes, &c.

*Double, Coloured*: Abel Carrière, Alphonse Lavallée, Charles Joly, Le Gaulois, Jean Bart, President Grévy, Emile Lemoine, Concordat, Prince de Beauveau, Maurice de Vilmorin, Mme Leon Simon, Duc de Massa, Renoncule, Michel Buchner, Marc Micheli, President Carnot, &c.

Most of these varieties, single and double, are easily forced into early



bloom when grown in pots and placed in a warm greenhouse from Christmas onwards. The masses of white Lilac, however, that find their way to the florists' shops before and after Christmas are not produced in this way. Plants are grown specially for this purpose, and the variety used is a purple-flowered one known as the "Marly". Thousands of this are grown in nurseries outside Paris, but few growers try the forcing business in England. Some of those who have done so have relinquished it, chiefly owing to the great drop in prices of late years, quite 50 per cent.

Plants that are to be forced are grown outside for at least three but usually four years, and are from 4–5 ft. high, each having roughly about three dozen shoots. From the top of each shoot two trusses of bloom (rarely more) are developed. The plants are lifted and placed in darkened houses in which a temperature of about 80° F. is maintained when growth has started, and also a very humid atmosphere. The exclusion of light during the day is one of the chief secrets of the process of forcing a purple Lilac to produce pure-white flowers, but great judgment is necessary as to when deep or partial shade is to be maintained. Some French growers have found that a very high temperature and total darkness are not absolutely essential, and have produced white flowers in other ways. Other experiments have been carried out by keeping the plants to be forced in a refrigerator or cold dark and moist shed for about a fortnight before transferring them to the forcing house, and it was found that flowers were fit to cut a week earlier than from plants that had not been treated in the same way. Lilac plants have also been etherized in hermetically sealed chambers for about forty-eight hours to test the bleaching effect on the blossoms. By whatever process the flowers are obtained, there is nearly always a good demand for them, and it only remains to produce them at a cost that will leave a reasonable margin of profit.

**Tamarix.**—A small genus of ornamental feathery-looking shrubs with twiggy stems and small scale-like leaves. The Common British Tamarisk (*T. gallica*) grows up to 12 ft. high, and is largely used for seaside planting. It produces its white or pink flowers from July to September. There are varieties known as *gallica*, *germanica*, and *odessana*. *T. chinensis* (*japonica plumosa*) is similar, but more graceful and feathery in appearance, and is not quite so hardy. Other less-well-known kinds are *hispida* (*khasgarica*), *parviflora* (*africana*), and *tetrandra*. They grow in ordinary garden soil and may be increased by cuttings of the ripened wood and by seeds.

**Tecoma** (*Bignonia*) *radicans*.—A climbing North American shrub with orange-scarlet foxglove-like flowers in summer. Sandy loam and warm positions. Increased by cuttings of the ripened shoots and by layers.

**Tilia** (**LIME**).—The Common Lime (*T. vulgaris*—also known as *T. europæa*) is a fine ornamental tree largely used for streets and for making avenues in large gardens and parks. There is a variegated form having creamy-white blotches on the leaves. Thousands of the common form



are raised annually in some nurseries. *T. platyphyllos* has very large leaves and grows up to 90 ft. high. It flowers before *T. vulgaris*. *T. petiolaris* is a fine Crimean tree with drooping branches, and leaves silvery white and downy beneath, as in the White or Silver Lime (*T. argentea*). The American Lime, Basswood, or Whitewood (*T. americana*) attains a height of 70 ft., and has many varieties, one called *mississippiensis* having leaves about 1 ft. long.

**Ulex europæus** (FURZE, GORSE, WHIN).—This prickly Leguminous evergreen is well known on commons, wayside banks, &c., throughout the British Islands. The double-flowered variety (*flore pleno*) when covered with yellow bloom is a fine picture, and is now largely raised from cuttings in cold frames, and grown on in pots for sale. The Common Furze is easily raised from seeds. The variety *strictus*, known as the Irish Furze, is stiffer in growth; and *nanus* and *Galli* are dwarf varieties that flower in the autumn.

**Ulmus campestris** (ELM).—The Common British Elm or Aume attains a height of over 100 ft., and the trunk a girth of over 20 ft. The ovate-oblong leaves are 2–3 in. long and somewhat pointed. There are several varieties, including *acutifolia*; *Berardi*, with smaller leaves and slender habit; *betulæfolia*; *stricta*, rigid; *tortuosa*, a peculiar twisted form; *virens*, the Kidbrook Elm, with almost evergreen foliage; *variegata*, leaves striped and blotched with white; and *Louis Van Houtte*, a golden-leaved form.

*U. montana*, the Scotch or Wych Elm, is similar to *campestris* and seems to be greatly confused with it, the varieties of one being often associated with those of the other. One of the best street trees, especially for seaside towns, is the Cornish Elm (*cornubiensis*), which has smaller and more deeply veined and more closely arranged leaves than the type. The variety *fastigiata*, known as the Exeter or Ford's Elm, is pyramidal in habit with peculiarly twisted leaves; there is a golden-leaved form of it (*aurea*). The Chichester or Huntingdon Elm (*vegeta*) is a very rapid grower. The Downton Elm (*pendula*) is a smooth-leaved variety of *campestris*, with a drooping habit. There are several other elms grown under such names as *Camperdowni*; *Dampieri aurea*, a fine golden-leaved form; *marmorata*, with mottled leaves; *Richardsoni*; and *Whitworthi*. All special varieties are usually grafted on stocks of the Common Elm.

**Vaccinium**.—This genus contains about 100 species of erect or trailing evergreen or deciduous shrubs chiefly remarkable for their berried fruits black, red, or purple in colour. The plants like a moist peaty soil, and are used sparingly for shrubberies and rock gardens. They are increased by seeds, layers, and cuttings. Amongst the best-known species are *V. Myrtillus*, the Common Whortleberry, Bilberry, or Blueberry; *V. stamineum*, the Dewberry or Huckleberry; and *V. Vitis-Idæa*, the Cowberry. All natives of North America.

**Veronica**.—Amongst the dwarfer shrubby kinds grown for rock gardens are *carnosula*, *chathamica*, *Bidwelli*, *cupressoides*, *epacridea*, *Haasti*, *Hectori*, *Hulkeana*, *Lyalli*, *lycopodioides*, *pimelioides*, *salicor-*

*noides*; all natives of New Zealand. Most of these are somewhat tender, and require protection in severe winters.

Perhaps the kinds which are grown most extensively are *V. Andersoni*, and its many beautiful varieties—all of hybrid origin. They are pretty shrubby plants, with elliptic glossy-green leaves and erect spikes of flowers in which there are now many beautiful shades of colour, such as rich purple, deep violet, pale blue, lavender, crimson, salmon pink, mauve, and pure white. There is a mere form with beautifully variegated leaves. A very old garden Veronica, *V. angustifolia*, at one time largely grown, is now rarely seen. It has narrow recurved leaves, and spikes of white flowers faintly tinted with lavender. *V. Traversi* (*decussata*) grows up to 6 ft. high, and is a charming evergreen with leaves arranged crosswise. The bluish-white flowers are borne in great profusion in summer.

**Viburnum.**—This genus contains about eighty species of ornamental trees and shrubs, deciduous and evergreen. The Wayfaring Tree (*V. Lantana*) is a British shrub, 12–20 ft. high, has broadly oblong heart-shaped wrinkled leaves which assume rich tints in autumn. The white flowers appear in May and June, and are succeeded by berries which are first red, but afterwards black. Fruiting sprays are largely used by florists. The Guelder Rose or Snowball Tree (*V. Opulus*) attains a height of 15 ft., and is recognized by its lobed leaves and creamy-white flowers, which in the variety *sterile* become large white Hydrangea-like bracts. There is a variegated form and also one with yellow instead of red berries. *V. macrocephalum*, from China, has large pyramidal trusses of pure-white sterile flowers like those of the Guelder Rose. The wild type known as *Keteleeri* has partly sterile and partly fertile flowers as shown in fig. 446. *V. plicatum* (fig. 447) is a splendid form of *tomentosum*, and has deeply veined leaves and heads of white sterile flowers. *V. prunifolium*, from North America, grows 6–15 ft. high, and has dark shining plum-like leaves which are richly coloured with red and purple in autumn. The pure-white flowers appear in May and June, and are succeeded by bluish-black fruits. *V. Tinus* is the well-known evergreen Laurustinus, 8–10 ft. high, with ovate leathery leaves and heads of white flowers (rosy in bud) which open from November until April and May. There are many varieties of it, such as *hirtum*, with hairy leaves; *lucidum*, with large glossy-green leaves; *strictum*, an erect-growing form, &c. *V. Davidi* is another quite hardy evergreen species, 1–2 ft. high,



Fig. 446.—*Viburnum Keteleeri*. Showing fertile flowers in centre, sterile outside.



recently introduced from China. It has large leathery oblong-elliptic pointed Bertolonia-like leaves, with scattered teeth on the margin, and three distinct veins. The flowers, which appear in April and May, are



Fig. 447.—*Viburnum plicatum*. Flowers all sterile.

pure white with bright-red anthers, borne in flat trusses 3–4 in. across.

*V. Henryi* is another evergreen, about 6 ft. high, with narrow oblong glossy-green leaves, white flowers, and trusses of crimson and black berries. *V. rhytidophyllum*

is a new and remarkable Chinese evergreen with long narrow deeply veined and wrinkled leaves. *Viburnums* grow in ordinary garden soil and are propagated by layers and cuttings.

**Vinca** (PERIWINKLE).—The larger kind, *V. major*, with large blue flowers, and the lesser one, *V. minor*, similar but smaller in all its parts, are well-known trailing evergreen shrubs with ovate glossy leaves. There is a white-flowered, and double blue-flowered form of *V. minor*, and one with silvery variegated leaves. *V. rosea* is a pretty greenhouse plant, with rose flowers, from Madagascar.

**Viscum album** (MISTLETOE).—This native semi-parasite flourishes on Limes, Poplars, Hawthorns, Maples, Mountain Ashes, Peaches, Robinias, and Apple trees, but is not encouraged in British orchards. Vast quantities of the forked stems, green-yellow foliage, and sticky whitish berries find their way to market about Christmastime, but the supplies chiefly come from the Continent. Beyond a certain amount of crude sap absorbed by the roots, which penetrate the tissues, the Mistletoe does but little harm to the host plant, as its leaves perform the work of assimilation and elaboration of food. Ripe seeds should be inserted in slits in the bark to secure a supply in the course of a few years.

**Vitex** *Agnus-Castus*.—An aromatic South European shrub, 6–12 ft. high, with lance-shaped pointed leaves, whitish beneath, and spikes of pale-lilac or violet flowers at the ends of the shoots. Increased by cuttings of the ripened shoots.

**Vitis** (including AMPELOPSIS).—A large genus of climbing or trailing deciduous shrubs with lobed or divided leaves which in many species assume brilliant tints of crimson purple, orange red, &c., in the autumn.



The Virginian Creeper (*V. quinquefolia*, *Ampelopsis hederacea*) is one of the best known. It attains a length of 60 ft., and is one of the most popular climbers in cultivation. There are several varieties of it, including *incisa*, with deeply cut leaves; *hirsuta*, downy leaves; and *muralis* or *Engelmanni*, which develops sucker-like tendrils that attach the plants to walls, fences, &c., without being fastened artificially.

*V. inconstans* (far better known as *Ampelopsis Veitchi* and *A. tricuspidata*) is a splendid Japanese climber seen almost everywhere, and propagated by thousands annually from cuttings, grafts, or seeds. It is very variable in the shape of its three-lobed leaves, some being larger and more coarsely toothed than others, and differing a good deal in colour at all seasons. Some varieties, however, are brilliant in autumn tints, and all cling naturally by means of suckered tendrils.

*V. Coignetiae* (*congesta*) is a Japanese climber with large rounded slightly lobed leaves 6–10 in. across, which assume rich crimson tints in autumn when grown in hot sunny positions (fig. 448). Raised by layers and grafts. *V. Thunbergi* is somewhat similar but larger. *V. heterophylla* is better known by its variety *humulifolia*, a splendid Chinese and Japanese climber with three- to five-lobed serrate dark-green wrinkled leaves. It is remarkable for its masses of turquoise-coloured berries speckled with black in autumn. *V. Labrusca*, a strong North American climber with roundish heart-shaped lobed leaves covered with reddish-brown down beneath, has large dark-purple or yellowish berries in autumn. *V. japonica* has leaves divided into five roundish oval serrate leaflets, and has a variety, *marmorata*, with broad yellowish blotches on the leaves.

Of late years a large number of ornamental kinds have been introduced, chiefly from China and Japan, and they include such as *amurensis*; *armata*; *Henryana*, with silvery veins; *Thomsoni*, with digitate leaves tinted with claret purple; and several others.

**Wistaria.**—The best-known species is *W. chinensis*, a rampant deciduous woody climber, with pinnate leaves and drooping racemes of pale-purple Pea-like flowers in early summer. There is a white-flowered variety, *alba*; a larger-flowered one, *macrobotrys*; one with silver and green foliage, *variegata*; and a double-flowered one, *flore pleno*. *W. multijuga*, from Japan, has lilac-coloured flowers in racemes often over 2 ft. long. Other species are *brachybotrys*, a Japanese, shrub 3–5 ft. high, with violet-purple



Fig. 448.—*Vitis Coignetiae*



flowers in short racemes; *frutescens*, from North America, with deep-blue flowers, much better in the variety *magnifica*; and *japonica*, a shrubby species with white flowers. The greatest trade is done in *W. chinensis* and *W. multijuga*, which are raised by grafting pieces of dormant stem in pieces of root plunged in bottom heat. (See Vol. I, p. 88.)



Fig. 449.—*Yucca recurvifolia*

**Xanthoceras sorbifolia.**—

A beautiful Chinese deciduous shrub, up to 15 ft. high, with pinnate leaves like those of the Mountain Ash, and terminal clusters of white flowers streaked with purple red. It is hardy in the mildest parts of the kingdom, and may be raised from seeds, layers, cuttings, or grafting on stocks of the Common Horse-chestnut, to which it is closely related.

**Yucca gloriosa.**—This is the best of the hardy Yuccas. It grows over 6 ft. high, and has dense rosettes of evergreen grey-green sword-like leaves up to 3 ft. in length, above which tower the thick branching spikes of white or greenish-white bell-shaped flowers resembling inverted Tulips. One of the best forms is *recurvifolia* (fig. 449), but there is

also a narrow-leaved form called *angustifolia*. *Y. filamentosa* is similar in appearance, but is recognized by having the edges of the leaves frayed into white thread-like filaments. The flower spikes often attain a height of 8 ft. There are forms known as *flaccida*, with softer recurving leaves, and one with blue-green narrow leaves called *glaucescens*. Yuccas flourish in rich loamy or good garden soil, and are increased by suckers and seeds.

## SECTION XXXI

### Conifers and Taxads

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Amongst forest and ornamental trees and shrubs, members of the Conifer family hold a deservedly high place. Many of them, like the Silver Firs (*Abies*) and the Spruce Firs (*Picea*), the Larches, Pines, and Firs, are valuable timber trees, and are raised in hundreds of thousands annually in several nurseries in the United Kingdom, and are disposed of when two to three years of age. For the purposes of the re-afforestation of our waste lands many kinds of conifers might be very largely planted in addition to Oaks, Beeches, Ashes, Birches, Sweet Chestnuts, and many others dealt with in the preceding pages. With the exception of the Larches, the Maidenhair Tree (*Ginkgo biloba*), the Deciduous Cypress (*Taxodium distichum*), most conifers are evergreen.

**Abies** (SILVER FIR).—The species have been greatly confused with the *Piceas* and the Pines, and the reader will find the names here given sometimes under one genus sometimes under another in catalogues. To put an end to the existing confusion it would be



Fig. 450.—*Abies nobilis*



well if growers would adopt the nomenclature in the "Report of the Conifer Conference" in Vol. XIV of the *R.H.S. Journal*, which has also been followed in the *Practical Guide to Garden Plants*. The Silver Firs most largely grown are the following, the heights given being those for fully grown trees in a native state: *amabilis*, 100–150 ft.; *balsamea*, 70–80 ft.; *bracteata*, 150–200 ft.; *concolor*, 100–130 ft., with a lovely blue-green variety, *violacea*; *grandis*, 200–300 ft.; *Lowiana*, 300 ft.; *magnifica*, 200–250 ft.; *nobilis*, 200–300 ft. (fig. 450), all from North America.

Amongst European and Asiatic species there are some very fine trees: *brachyphylla*, 120 ft., Japan; *cephalonica*, 80–100 ft., Greece; *firma*, 100 ft., Japan; *Nordmanniana*, 80–100 ft., Caucasus; *pectinata*, the Common Silver Fir of Central and South Europe, with many varieties; *Veitchi*, 120–140 ft., Japan; *Webbiana*, 80–90 ft., Himalayas. Most of the above are called "Picea" in nurserymen's catalogues.

**Araucaria imbricata** (MONKEY-PUZZLE TREE).—This noble-looking Chilian Pine, with spiny-tipped and spirally arranged leaves, is well known. It attains a height of 150 ft. in a native state, but rarely more than 50 ft. in the British Islands. The Norfolk Island Pine (*A. excelsa*) is dealt with in Vol. II at p. 127.

**Cedrus** (CEDAR).—The best-known species are the Deodar (*C. Deodara*), largely grown, 150–200 ft., Himalayas; the Atlas Cedar (*C. atlantica*), of which there are several varieties, including a silvery one, *argentea*, and a blue-green one, *glauca*, 80–100 ft., Atlas Mountains; and the Cedar of Lebanon (*C. Libani*), 80–100 ft., Asia Minor.

**Cephalotaxus**.—A genus of Japanese and Chinese Taxads, not largely grown, and including *drupacea*, 20–30 ft; *Fortunei*, 40–50 ft.; and *pedunculata* (*Podocarpus koraiana*), 15–20 ft., with a variety *fastigiata*, resembling the Irish Yew in habit.

**Cryptomeria japonica**.—A beautiful Chinese and Japanese evergreen, 130–150 ft., with several varieties, including *elegans*, *viridis* or *Lobbi*, *nana*, and *spiralis*.

**Cunninghamia sinensis**.—A remarkable Chinese tree, 40–50 ft. high, rather too tender for most parts of the kingdom. There is a blue-green variety, *glauca*.

**Cupressus** (CYPRESS).—Botanically this genus includes *Chamæcyparis* and *Retinospora*, but the latter is kept distinct in this work. Amongst the *Cupressus* proper, Lawson's Cypress (*C. Lawsoniana*), from California, and its many beautiful varieties, are raised in thousands from seeds and cuttings every year. In a native state Lawson's Cypress grows up to 200 ft. high, but the tallest trees in Britain are little more than 50–60 ft. high. Amongst the best varieties are *erecta viridis*, *Allumi*, *Fraseri*, *glauca*, and several with silvery variegation (*albo-variegata*, *argentea*, *Silver Queen*, &c.); and golden variegation (*aureo-variegata*, *lutea*, &c.); some with more pyramidal habit (*pyramidalis*, *albo-spica*); and others like *Triomphe de Boskoop*, a pretty blue-green variety; *versicolor*; *Wisseli*, &c.

There are several other Cypresses, including *macrocarpa* and its variety *lutea*; *Macnabiana*; *lusitanica*; *nootkatensis*, &c., the latter better known as *Thujopsis borealis*, with varieties *albo-variegata* and *lutea*. The White Cedar (*C. thyoides* or *Chamaecyparis sphaeroidea*), 30–60 ft. high, from the swampy regions of North America, is a good plant, and has a fine golden-coloured variety called *lutea*.

**Ginkgo biloba** (*Salisburia adiantifolia*).—This is the deciduous “Maidenhair Tree” of Japan and China. It grows up to 80 ft. high, and has leathery fan-shaped leaves veined like the pinnules of a Maidenhair Fern. It is perfectly hardy in most places, and is raised from seeds (fig. 451).

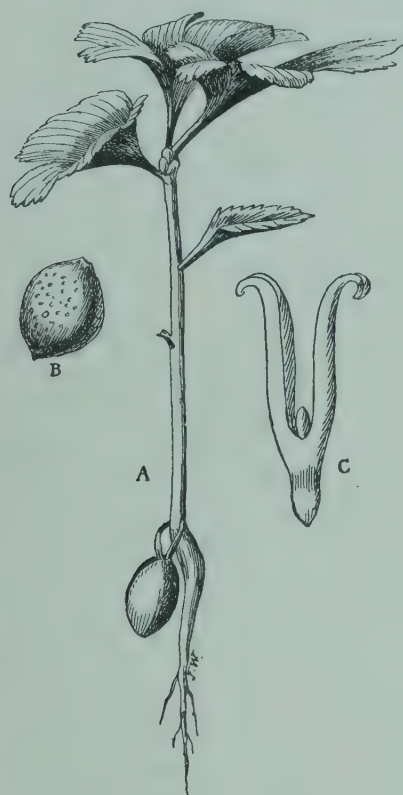


Fig. 451.—*Ginkgo biloba*

A, Seedling plant. B, Almond-like fruit with pitted bony shell. (½.) C, Embryo (×2).

**Juniperus**.—There are about thirty species of Juniper known, mostly ornamental and easily grown in moist soil. They are increased by seeds and cuttings, and choice varieties are grafted on stocks of the common species. *J. chinensis* is dioecious, and one of the best with pyramidal habit, the male plant being better than the female. There are several varieties, such as *albo-variegata*, with silvery variegation at the tips of the shoots; *aurea*, with beautiful golden young foliage; and *glauca*, with blue-green tints. The Common Juniper (*J. communis*) grows from 3–50 ft. high, and has also several varieties, of which the Irish Juniper (*hibernica*), with erect columnar habit, is one of the best. Other forms are *alpina*, *glauca*, and *pendula*. The Common Savin (*J. Sabina*) is a nice branching shrub up to 8 ft. high, with several varieties, including *prostrata*, a good

trailing plant for rock gardens; *tamariscifolia*, the “Carpet Juniper”, a trailer with bright-green slender shoots; and *variegata*, the branchlets of which are prettily variegated with creamy white or pale yellow. The Red or Pencil Cedar (*J. virginiana*) grows up to 90 ft. in the United States, but is often only a low shrub in some places. There are several varieties, such as *albo-variegata*, *aureo-variegata*, *pendula*, *Gossaintheana*, *elegans*, *glauca* (very handsome), and several others. The greenhouse Juniper is dealt with in Vol. II, p. 177.

**Larix europæa** (COMMON LARCH).—A well-known deciduous conifer, 80–100 ft. high, grown in hundreds of thousands for forest purposes. There are several varieties, including *pendula*, with weeping habit. Owing to lack of cultivation and badly ventilated soil, plantations are sometimes attacked by a minute fungus (*Peziza Willkommii*), which spreads rapidly. The Japanese Larch (*leptolepis*) is a beautiful tree, but not so valuable economically as the common one. The Golden Larch (*Pseudo-*



*larix Kämpferi*), which attains a height of 130 ft. in China, resembles the European Larch in appearance, but the foliage, at first bright-yellowish green, turns to golden yellow in autumn.

**Libocedrus decurrens.**—A beautiful Californian Conifer, 50–150 ft. high in a native state. It is often erroneously called *Thuya gigantea*, but may be recognized by its small, linear, bright glossy leaves, imbricating in four rows on the plaited or flattened branchlets, and by its solitary olive-brown cones, about 1 in. long, at the tips of the shoots. More tender kinds are *Doniana* and *tetragona*.

**Picea (SPRUCE FIR).**—The plants mostly known under this name in nurseries are referred to under the genus *Abies* in this work (see p. 59), and, with strange perversity, the *Piceas* proper are known as *Abies* in nurseries. The most important kinds are *Alcockiana*, a beautiful pyramidal Japanese tree, 90–120 ft. high; *alba*, 50–170 ft., North America, the White Spruce, valuable for damp situations; *ajanensis*, 70–80 ft., Japan; *Engelmanni*, 80–150 ft., Rocky Mountains, with a fine variety, *glauca*. *P. excelsa*, the Common Norway Spruce or Burgundy Pitch Pine of North Europe, 100–120 ft. high, supplies the white deal of commerce. It is well known in a small state as the popular Christmas Tree. There are numerous varieties, amongst the best being *Clanbrassiliana*, a dense bush, 2–3 ft. high; *aurea*, shoots tipped with yellow; *pygmæa* (*nana*), a pyramidal shrub about 1 ft. high. *P. Morinda* (*Smithiana*), from North India, 80–120 ft., has an elegant drooping habit. *P. nigra*, the Black North American Spruce, 50–70 ft., a quick-growing tree with blue-green foliage, has a dwarf variety, *pumila*, 3–4 ft., and a red-barked one, *rubra*. *P. orientalis*, from the Caucasus, is a somewhat dense-growing Spruce, with a golden form, *aurea*, and a dwarf one, *pygmæa*. The Tiger-tail Spruce (*A. polita*), a handsome Japanese conifer with yellow-barked shoots, makes a splendid lawn tree. The American Blue Spruce (*P. pungens*) grows up to 160 ft., has rich orange-coloured bark, and its varieties, *argentea*, with silvery hues, and *glauca*, blue green, are charming lawn plants, but even they are inferior in beauty to *Kosteri*, a splendid one with conspicuous foliage. It is usually grafted on stocks of the type. The Sitka Spruce (*P. sitchensis*, *Abies Menziesi*) grows up to 200 ft. in California, and has been largely planted in Britain. It is valuable for hilly districts and for forest work in general.

**Pinus.**—The Pines constitute a large genus of evergreen trees divisible into three natural groups, viz. (1) those usually having two leaves in a sheath, such as the Corsican Pine (*P. Laricio*), and the Scots Fir (*P. sylvestris*); (2) those with three leaves in a sheath, like *P. Coulteri* (*macrocarpa*) and *P. ponderosa*; and (3) those having five leaves in a sheath, like *P. Cembra*, *P. excelsa*, and *P. Strobus*, the Weymouth Pine.

Amongst the kinds most largely raised in nurseries are the Austrian Pine (*nigricans* or *austriaca*); *P. Cembra*, the Swiss Stone Pine, which grows almost anywhere. There are several forms, including a new golden one, *aurea*. *P. excelsa*, the Bhotan Pine, is a quick-growing Himalayan



Pine with drooping blue-green tassels of flexible leaves. *P. Jeffreyi* grows up to 100 ft. high in California and flourishes in light soil. *P. parviflora*, 25–40 ft. high in Japan, is distinct in appearance. *P. ponderosa* attains a height of 300 ft. in California. The Scots Fir (*P. sylvestris*), 50–100 ft. high, is well known by its rugged reddish bark and dense heads of blue-green foliage; and the Weymouth Pine (*P. Strobus*), from North America, 80–170 ft. high in a wild state. The species mentioned are all valuable timber trees. There are several others not so largely grown.

**Podocarpus andina** (*Prumnopitys elegans*). — A beautiful Chilian Taxad, 50–60 ft. high, pyramidal in habit, with glossy-green leaves, whitish beneath, and grape-like fruits.

**Pseudotsuga** (*Abies*, *Picea*) **Douglasi** (DOUGLAS FIR).—This valuable timber tree, which attains a height of 300 ft. in North America, grows quickly, and is raised in thousands from seeds. There are varieties known as *glauca*, *pendula*, *taxifolia*, *Standishi*, *plumosa*, &c.

**Retinospora**. — Although really forms of *Cupressus*, the *Retinosporas* are so distinct in appearance and habit that they are kept separate for business purposes. A great trade is done in varieties of the Japanese *C. obtusa*, some of the best-known forms being *albo-picta*, *aurea*, *compacta*, *filicoides*, *gracilis aurea*, *lycopodioides*, *nana*, and *plumosa*—names which convey an idea as to habit or appearance and colour. There are several forms of the feathery *plumosa*, such as *albo-picta*, *argentea*, *aurea*, &c. *R. pisifera* is another elegant variety of *obtusa*, more graceful and slender in appearance. There are many forms of it, including *filifera* (fig. 452), *f. aurea*, and *squarrosa*. The plant known as *leptoclada* is probably a form of *Cupressus thyoides* (*R. ericoides*), and has a nice pyramidal habit. Amongst other varieties of *obtusa* are *Crippsi*, a fine golden one, with dwarf and slender forms.

**Saxegothea conspicua** (PRINCE ALBERT'S YEW).—A handsome Yew-like Taxad from the Chilian and Patagonian mountains, where it grows 30 ft. high. It has a graceful and drooping habit, and is becoming better known.

**Sciadopitys verticillata** (UMBRELLA or PARASOL PINE).—A beautiful



Fig. 452.—*Retinospora filifera*



and distinct *Taxad* from Japan, where it attains a height of 100–150 ft.

The branches and the “leaves” upon them radiate like the ribs of an umbrella (fig. 453).



Fig. 453.—*Sciadopitys verticillata*

**Sequoia** (*Wellingtonia*) *gigantea*.—The Mammoth Tree of California. This tree grows up to 350 or 400 ft. high, with trunk 20–40 ft. in diameter in a wild state, and is said to attain an age of 2000 to 3000 years. It rarely grows taller than 50 ft. in the British Islands. *S. sempervirens* (*Taxodium*), the Californian Redwood, grows as well but not quite so tall in good soil.

**Taxodium distichum** (DECIDUOUS or BALD CYPRESS).—A handsome deciduous tree, 80–150 ft. in the United States. It flourishes in water, or in marshy and swampy places. There are several varieties, one of the best being *pendulum*, with slender drooping branches

and small closely adpressed leaves. Other species are *heterophyllum* and *mucronatum*, the latter a rather tender Mexican tree.

**Taxus baccata** (YEW).—The deep and sombre-green Yew is largely grown as a hedge plant, and is sold in thousands annually. There are many varieties, of which the Irish Yew (*fastigiata* or *hibernica*) is the best known on account of its pyramidal habit. There is a golden-leaved variety (*aurea*), and a silver variegated form (*argentea*) of it. There are also golden and variegated forms of the Common Yew; and an upright one, called *Dovastoni*, with weeping and variegated sub-varieties. There is also a golden-fruited form (*fructu lutea*). Special varieties are grafted on stocks of the Common Yew.

Other kinds of Yew are *canadensis*, the American Ground Hemlock, a straggling shrub with a variegated and golden form; and *cuspidata*, from Japan, with spiny-tipped leaves, yellowish beneath.

**Thuja** (ARBOR VITÆ).—Two species, *T. gigantea* (*T. Lobbi*) and *T. occidentalis*, the American Arbor Vitæ, and their varieties, are chiefly grown. *T. gigantea* is a fine pyramidal tree, quick in growth and excellent for making hedges. There are several varieties, such as *atrovirens*, *aurea*, *lutea*, *gracilis*, &c. *T. occidentalis* grows naturally in cold wet swamps and on rocky banks. There are many forms, including *compacta*,

*alba*, *aurea*, *argentea*, *lutea*, *Ellwangeriana*, dense growing; *Hoveyi*, roundish and compact; *Vervœneana*, slender and golden tinted; and others.

*T. (Biota) orientalis*, from China, is somewhat variable in habit, and has many pretty varieties having silver, gold, blue-green, and variegated foliage (*argentea*, *aurea*, *glauca*, *variegata*), and others differing in habit, such as *compacta*, *gracilis*, *elegantissima*, *pyramidalis*, &c. The Weeping Arbor Vitæ, *pendula*, has drooping thread-like branchlets.

*T. dolabrata* (better known as *Thujopsis*) is a fine Japanese tree, with drooping flattened branches. The variety *latevirens* is a dense-growing bush, 4–6 ft. high, excellent for hedge purposes; and the variety *variegata* has pale-yellowish branchlets.

**Torreya.**—This genus contains a few strong-smelling Yew-like evergreens, of which the best known are *californica* (or *Myristica*), *grandis*, *nucifera*, and *taxifolia*—the last-named being known as the Stinking Cedar of Florida.

**Tsuga.**—The members of this genus are usually known either as *Abies* or *Picea*. The best known are the Hemlock Spruce (*T. canadensis*), 70–110 ft. in a native state, with feathery branches. There are several varieties. Prince Albert's Spruce (*T. Mertensiana*), a graceful tree; and *T. Pattoniana*, all from North America; and *T. Sieboldi*, from Japan. The Tsugas are recognized by the silvery whiteness on the under surface of the leaves.



## SECTION XXXII

# Vegetable Growing for Market

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### § I. GENERAL CONSIDERATIONS

When the growing of vegetables is contemplated, questions of market and carriage assume an importance that did not belong to them so long as the cultivation of fruit was alone under consideration. The vegetables that yield the best return to the cultivator are the earliest in the spring; but it is desirable not only to supply the spring market, but to continue the supply during the hot months of summer and right through autumn and winter.

**Soil.**—Shallow gravelly soil freely manured will do the first, but will suffer the crops to burn in summer, and give little chance in many years for autumn crops to establish themselves. Strong loamy land will hold the summer crops and afford better opportunity of getting out the autumn and winter crops, but will be too cold for early crops in the spring.

Deep alluvial land, sheltered from the north and east, sloping, if sloping at all, to the south and west, will do all three. Such are the old convent lands of Evesham; such were the rich market garden lands of Fulham, now, alas! buried under bricks and mortar.

**Water.**—There must be a plentiful supply of water at small cost for vegetable growing: for not only will it sometimes be necessary to water the seed beds, those magazines from which the fields must be charged, but the preparation of the vegetables for market includes washing and watering. Any doubt as to the sufficiency and availability of the water supply must be set at rest before any binding contract for a "take" is made.

A well of moderate depth, giving a regular supply, with wind pump and raised tank for storage, or, better still, pump worked by oil engine or gas engine will do.

**Markets, Carriage, &c.**—Convenient access to market is an indispensable condition, and this considerably restricts the area of possible selection for a vegetable garden.

Dependence, too, upon railway carriage solely is not to be desired, because there are many vegetables which will not arrive at market in

a presentable condition after the delay and knocking about often incident to this method of transport. During the hot months of summer particularly, and to a less extent all the year round, the object should be to get the vegetables to market as quickly as possible, and to preserve on them as much of the bloom and freshness of the garden as possible.

There is a vast increase in the demand for vegetables waiting to express itself when they can be got on to the table of the town purchaser in a similar condition of freshness and crispness to that enjoyed by the consumer who has them direct from his own private garden. It is true that large districts where market gardening is the vogue, in Worcestershire and Bedfordshire, as well as other parts of the country, depend entirely upon the railways to distribute their produce. This fact does not traverse the opinion that he who would start out in the enterprise of growing vegetables for profit will be well advised to settle, in preference, where his produce, without further handling, can be carried in his own vehicles to the market where it is to be distributed to the retailers.

The introduction of mechanical road transport has considerably extended the definition of what is "convenient distance". The horse walking at  $2\frac{1}{2}$  to 3 ml. per hour, in point of time as well as in point of physical endurance makes 20 ml. from market the utmost limit, and that only where the roads are good. If mechanical traction be installed, the limit is easily extended to 30 ml. or more, depending still somewhat on the character of the roads to be traversed.

**Horse versus Motor.**—On the question of horse against motor for transport, it may be set down that within a distance of 10 ml. the supremacy of the horse is unchallenged, from 12 to 15 ml. the motor has an advantage, from 15 to 20 ml. the motor increases its advantage, from 20 ml. upward the horse is impossible.

It would be of great advantage to have reliable figures of the comparative cost. These are most difficult, however, to obtain. Where they are given, too much reliance should not be placed upon them, unless all the conditions of user in each case are clearly stated. The horse when at home can be used upon the land. How much is allowed for that? The horse when not at work is eating. Is that reckoned? The motor is of no use on the land, and, when there is no hauling to be done, no matter how pressing is the work on the land, stands idly by. Is that fact discounted? In busy times the motor has no physical endurance to consider, and can keep on working provided drivers are available. Is that credited? If there could always be a return load the cost per ton per mile for motor transport would be materially lessened, because the difference in wear and tear and fuel between coming back loaded and empty is small as regards the motor, while the load back will take a good deal out of the horses.

Someone has given the comparative cost as 8*d.* per mile for the horse and 4*d.* for the motor. It may be taken that, provided there is



a fairly regular load all the year round, and the distance is 12 ml. or over, whether with good roads or bad, the motor, both as to cost and ease of organization, will prove preferable to the horse. The following figures of actual cost were given by Lieut.-Col. R. E. B. Crompton, C.B., in a paper read before the Institute of Civil Engineers:—

COST OF CONVEYING MARKET-GARDEN PRODUCE TO MARKET BY STEAM  
TRACTORS AND TRAILERS (September, 1906)

Distance to first market	...	...	...	...	12 ml.
Average number of journeys to this market per week	...	...	...	...	12
Distance to second market	...	...	...	...	5 ml.
Average number of journeys to this market per week	...	...	...	...	4
Sundry journeys to station	...	...	...	...	8
Number of tractors employed	...	...	...	...	3
Number of trailers employed	...	...	...	...	5
Average load out	...	...	...	...	6 tons.
„ return load, sometimes manure sometimes empties	...	...	...	...	3 „
Total annual mileage of three tractors	...	...	...	...	16,640 ml.
Average annual mileage per tractor	...	...	...	...	5,546 „

	Average per Tractor per annum.			Per mile.
	£	s.	d.	
Wages	140	0	0	6·058
Fuel (Welsh coal)	40	0	0	1·730
Lubricants	10	0	0	0·432
Maintenance and repairs	25	10	0	1·103
„ „ „ of trailers	10	0	0	0·432
Depreciation at 20 per cent per annum	80	0	0	3·456
„ of trailers at 7½ per cent	18	15	0	0·811
Insurance (fire, third party, and boiler)	14	0	0	0·605
Water	1	15	0	0·757
	<u>£340</u>	<u>0</u>	<u>0</u>	<u>15·384</u>

Not only is convenient access to market important, but the character of the market itself is a matter worth consideration. When one talks of market, most people's minds turn towards London. It is said to be easier to get Worthing Tomatoes in London than in Worthing, and that the supplies for Brighton go up to London first. Let anyone go over the flower-carpeted fields of the Scilly Isles in spring and ask what is the goal of all the wealth of blossom, and London will have chief place in the reply. Ask of the proprietors of the acres of Broccoli that clothe the fertile slopes around Penzance, where they turn their anxious thoughts in spring, and London will come first. Long lines of wagons laden with market-garden produce may be seen every night wending their way along every road leading to London, and in the early morning the fruiterers and greengrocers will start out in their vans and carts along the same roads, and often bring back some of the stuff almost to the very place whence it started. It is truly amazing to contemplate the quantity of produce disposed of every day in the metropolis.

**Gluts.**—But the market is sometimes glutted, and the increasing frequency of the gluts forces upon one the question whether the process of concentration has not gone far enough, and whether there are not places in England where the supply is still not equal to the demand, or where a more efficient supply would not stimulate a demand worth the while of growers to cater for. In June, 1910, when good Paris Cos Lettuces were being sold in London at 2*d.* the score, in Margate the only Lettuces a careful investigation could discover in the retail shops were leathery, bolting, Hardy Cos, and these were priced at 2*d.* each! Similarly, the only Radishes one could see were aged, ill-washed specimens, such as any market gardener worthy of the name would have thrown to the rubbish shoot. If the related experiences of visitors is to be relied upon, other watering-places fare no better in this matter of a regular supply of fresh, well-grown vegetables.

Here, then, it would seem is an opening in a field not already worked, in which the man who is prepared for the thought, skill, and effort necessary to maintain a constant supply of vegetables properly grown and presentably put up should reap an adequate reward. But indeed this question of the distribution of market-garden produce, which has been growing in urgency for years, is fast becoming acute, as the sudden emergence of market gardening into a fashionable occupation and the development of the "small holdings" movement combine to put more produce on to the market.

Are the gluts caused by over-production? Is it not rather that a faulty and outworn system of distribution fails to convey to the consumer the full benefit of the lowness of price in the wholesale market, which of itself would react on the demand and provide an alleviation to the producer by giving him larger sales in return for lower prices? There are tens of thousands of young people "living in" in the great and small emporiums of London and the suburbs, not to mention the cities of the provinces. Are their tables ever adequately supplied with vegetables, no matter how cheap on the market? Does the fact of Lettuce at 2*d.* a score ever result in the bread and butter of their tea-table being economized by the accompaniment of the crisp and cooling leaves of the salad? There is room for a great movement to reorganize distribution and stimulate demand; and if the increasing encouragement of production is not to result in disaster it must be taken in hand at once.

**Rent.**—The rent to be paid will depend upon the quality of the land and its distance from market. The rich land of the old Fulham market gardens, within 6 ml. of Covent Garden, was cheaper at £7 per acre than is that to which some of the dispossessed growers have been driven at a quarter that sum. Land which naturally contains many of the constituents that make fertility can be taken at a higher rent than can land in which they must be supplied by the cultivator. It is therefore impossible to lay down any general scale of rent; it will be found



to be governed in most places by the action and reaction of supply and demand in the neighbourhood. A more important thing than the amount of the rent is to get the fact acknowledged in the agreement or lease of tenancy that the land is let for the business and purpose of a *market gardener*. This will secure the protection of the Market Gardeners Compensation Act, which is now incorporated in the Agricultural Holdings Act, 1908. When this is done the cultivator can, without hesitation or fear, proceed to develop all the latent cultural possibilities of his holding. He will be wise not to attempt too much at once. Some processes of tillage, while excellent as means of ultimately increasing the productivity of the soil, are expensive to carry out and take some time before the full return is yielded. They mean that capital is locked up for a time. This is all very well provided that the capital can be spared. Where it cannot be, the crippling effect on the finances more than outweighs the cultural benefit. In the course of some little experience with small holders it has been observed how many make shipwreck through apparent inability to measure accurately the extent of their resources. Some will try to bring all a holding, previously farmed, into market gardening in the first year; with the result that the work is all along master of them: crop after crop is put in weeks behind time. The season finishes with more or less of the land in the undisputed possession of the armies of the weeds and scarcely any crops worth anything. If a part only had been attempted, and the rest farmed, there would have been something tangible to show for the year's work. In a recent case of a County Council small holder who settled upon a holding, left in a filthy condition by the previous tenant, with splendid enterprise and industry he started to fork out the "couch". The result is his holding is poorly cropped, his little capital exhausted. He has cleared a part at tremendous expense of labour, but he has failed to maintain the source of revenue, without which retention of the holding is impossible. A very clever and successful market gardener, who on rich soil close to London had saved a decent fortune, took a farm for his eldest son to market garden. He immediately started to have the whole of it two-spit trenched. The soil was a medium loam on a bed of brick clay. Before the hungry yellow stuff brought on to the top could be induced to yield a crop, his fortune was all spent, and both father and son were ruined.

**Deep Culture.** — Deep tillage is a splendid thing in the cultivation of vegetables; but before the market gardener, who wants to keep clear of the bankruptcy court, listens to the advice of those who would advise the bringing up of the subsoil, let him try small experiments. Let him, above all things, keep his land cropped. Let him remember that good crops and plenty of hoeing are half the battle in cleaning dirty land. Where land is ploughed, and there is enough horse strength, the subsoil grubber can always be made to follow the plough, except in the rush of summer, when the land cleared in the evening should be recropped the next day.

A good and inexpensive subsoil grubber can be made by buying an old iron plough at a sale and simply removing the breast.

**Manure.**—The results of the most recent experiments go to show that the best crops are obtained from a moderate quantity of stable manure, supplemented by a judicious combination of chemicals. Near large centres of population, where stable manure can be obtained readily at moderate price, little else is needed. Where, however, it is scarce and dear, organic manures in some other form and chemical manures must be brought in. In this matter, again, it is impossible to generalize. One knows highly successful market gardeners who hardly ever have used anything but stable manure; and others who, beyond what little is made in the place, have depended entirely on what are called "waste-product" manures and chemicals. No one who has studied the matter will deny that, apart from the fertilizing agents it brings to the soil, there is a physical effect exerted by stable manure on the texture of the soil, which is most valuable and can hardly be supplied by anything else. *Nitrates*, either in the form of nitrate of soda or sulphate of ammonia to give a filip in the spring, or in the form of crushed hoofs in the autumn; *phosphates* in the form of basic slag or crushed bones in the autumn, or superphosphate or dissolved bones in the spring; *potash*, either in the form of kainit in the autumn or sulphate of potash in the spring, are the manures the market gardener who wants to supplement stable manure must consider.

A great difficulty is created for the market gardener by the heavy manurings his constant cropping with crops requiring high conditions of fertility necessitate. The land gets into a condition analogous to that of the gourmand. Another source of difficulty is the close family relationship which exists between many of the crops which he must grow. The beneficial change secured for the land by the farmers' four-course rotation is difficult to obtain in a market garden that is not partly farmed.

Hence the market gardener is flogged by that scourge called "club", common to all plants of what botanists call the "*Cruciferae*". Scientific research has failed to discover a remedy, though there are palliatives. As a correction both to the overfeeding of the land and to the conditions resulting in attacks of "club", frequent applications of fresh slaked lime have been found valuable. The usual manner of application is to deposit the lumps of unslaked lime in small heaps to the amount of 3 or 4 tons per acre, then to cover these heaps with a light covering of soil and leave them to slake, which in normal weather will occur in four or five days. Then as much may be spread each morning as can be ploughed or dug in during the day.

Lime must not be applied at the same time as manure, because its chemical action will be to dissipate too readily the nitrates contained in the manure. Market gardeners going on the market to purchase manures should make themselves master of the principle of unit value. A knowledge of this will prevent their being rooked by vendors of manures that are practically worthless. The Board of Agriculture Leaflet No. 72 is an excellent one for this purpose. (See also Vol. I, p. 162.) [W. G. L.]



**Natural Groups.**—In the following pages the various vegetable crops are described chiefly in alphabetical order for the sake of convenient reference. It may be as well, however, to set them out in their natural groups as far as possible, so that one may see at a glance how the principles of rotation may be applied.

- I. BRASSICAS or CABBAGE CROPS.—Broccoli, Borecole or Kale, Brussels Sprouts, Cabbage (including Savoy), Cauliflower, Kohl-rabi, Sea-kale, Radish, Turnip. These are all subject to attack from the "Club-root" fungus (*Plasmodiophora brassicæ*).
- II. LEGUMINOUS or NITROGENOUS CROPS.—Beans (Broad, Dwarf or French, and Runners) and Peas. The roots of these crops increase the stores of nitrogen in the soil by the bacterial nodules on their roots. See Vol. I, p. 125.
- III. UMBELLIFEROUS CROPS.—Carrots, Parsnips, Celery, Parsley.
- IV. SOLANACEOUS CROPS.—Potatoes, Tomatoes.
- V. BULBOUS or ALLIACEOUS CROPS.—Onion, Leek, Garlic, Shallot.
- VI. COMPOSITE CROPS.—Artichokes (Jerusalem and Globe), Lettuce, Salsafy, Scorzonera, Chicory, Cardoon.
- VII. MISCELLANEOUS.—Beetroot, Spinach, Rhubarb, Vegetable Marrow, Asparagus, &c.

Crops belonging to the same family have somewhat similar natures, and are as a rule subject to the same diseases and pests. Their roots have a similar effect on the soil, and it is possible that so-called "soil sickness" is due to the superabundance of certain secretions from the roots. Consequently when plants of the same nature are grown in the same soil continually, without a reasonable lapse of time, their roots find themselves surrounded by the injurious organic secretions of previous crops. And yet, if plants of a totally different nature were put in the same soil, the secretions (no doubt bacteria of some kind), instead of being injurious, would in all probability be of great benefit to them. It is thus easy to conceive a state of affairs in the soil by means of which the refuse of one crop may be of use to another of a dissimilar nature. By changing the various crops from one piece of land to another, therefore, not only does the ground get a "change", but the new crops are likely to be in a position to make use of what their predecessors threw away; in other words, one plant's meat may be another plant's poison. From this it follows that it would not be wise cultivation to crop soil in succession with plants belonging to the same natural groups outlined above. The crops in any one group may follow those in any other, thus securing a beneficial change of soil and food.

## § 2. ARTICHOKE

**The Jerusalem Artichoke** (*Helianthus tuberosus*).—This tuberous-rooted plant is closely related to the common Sunflower, and resembles it in appearance. Except in very hot seasons and in the most favoured

spots, however, it rarely flowers in the British Islands. This is rather in its favour from a market grower's point of view, as flowering would tend probably to a considerable decrease in the size and quantity of the underground potato-like tubers. Owing to its great vigour, the Jerusalem Artichoke is an excellent plant for poor and badly drained ground, as the evaporation of moisture from the leaves is great during the period of growth. (See Vol. I, p. 120.)

The Jerusalem or Potato Artichoke is an easily cultivated vegetable for which the demand is very fluctuating. It is generally planted in the bottom of balks, like Potatoes. Soot, wood ashes, and potash are good manures. The plants require earthing in the summer, as potatoes do, but watch must be kept so that all horse hoeings and the earthing are finished before the tops grow too high, or the whipple tree will break them off; and where this occurs the plant will spend its energy in producing a bunch of stems instead of tubers.

The tops, when green, are useful forage for horses, cattle, or sheep. Lifting may commence in October and continue all the winter. The tubers are quite hardy—no frost will affect them—so that they can be left in the ground.

There are two sorts in cultivation—the “red” and the “white”. The latter is the stronger grower and produces the heaviest crops, though customers will be found sometimes to ask for the red. The Artichoke, by its strong growth, forms a good crop to plant on land that has got foul, but as every little piece of tuber left in the land will grow in the following spring, it needs to be followed itself by a strong crop, and one that will admit of the horse hoe being used freely.

The Artichoke has of recent years developed a fungoid disease which attacks the stalk when nearly full-grown and kills the plant. Little is known of this disease yet, and no remedy for it has been found.

Artichokes cost about 3*d.* per bushel to dig; the crop of marketable tubers is 4 to 5 tons to the acre; the price varies from 2*s.* 6*d.* to 1*s.* 6*d.* per bushel; the demand is very limited.

The small and broken tubers that cannot be marketed, if cooked, make good food for pigs. [W. G. L.]

**The Globe Artichoke** (*Cynara Scolymus*).—Although belonging to the same family as the Jerusalem Artichoke, this plant is quite distinct in appearance, and resembles a large and coarse-growing grey-green thistle. It is gradually winning its way amongst market gardeners in England, and here and there one may see 1 or 2 ac. of it. It is cultivated for the large globular flower heads, the fleshy bracts of which are eaten. It is essential to cut the flower heads before the blossoms appear, otherwise the bracts will be useless as a comestible. From 13,000 to 20,000 heads, each weighing about 8 oz., can be obtained from 1 ac. of ground.

The Globe Artichoke, for which the demand at present is very limited and local, is grown from plants “suckered” off the parent stools in the early spring, and planted with dibbers in rows 4 ft. apart and 2 ft. 6 in.



from plant to plant. It requires a moist soil and a sheltered position. The plant throws up "fruit" like enlarged thistle heads, which are cut with

6 or 7 in. of stem as soon as they are full grown. These heads are dipped in water and packed for market. The price varies, according to the season and the size and quality of the "chokes", from 2s. per dozen down to 8d. per dozen.



Fig. 454.—Globe Artichoke—Large Green or De Laon



Fig. 455.—Seed of the Globe Artichoke (*Cynara Scolymus*)

The crop, when once established, can remain for several years. The plants will not stand hard frost, so that before winter sets in they must be protected by a covering of mould put up much as celery is banked.

[W. G. L.]



Fig. 456.—Chinese Artichoke (*Stachys tuberifera*)

**Chinese Artichoke.**—This hardy perennial from China and Japan belongs to the Labiate or Dead-nettle family, and is botanically known as *Stachys tuberifera*. It has nothing to do with the Artichokes proper, but the taste of the whitish spindle-shaped tuberous roots (fig. 456) very much resembles that of the tubers of the Jerusalem Artichoke. These tuberous roots, constricted into roundish divisions, find their way in small quantities to markets like Covent Garden, but the trade in them is small at present, and will probably never develop to any great extent. The plants are easily

grown in any ordinary good garden soil, and require no attention beyond keeping the weeds down with the hoe. The tuberous roots should be



planted in February and March, about 1 ft. apart every way, and about 3 in. deep. In due course the square stems, bearing roughish, oval, dull-green leaves, appear, making branched bushy tufts 12 to 15 in. high. Creeping roots are thrown out in every direction beneath the surface of the soil, and on these numerous new tubers are developed in the course of the season, becoming ripe in October. They may be eaten raw, or roasted, boiled, or steamed, and served with melted butter or other fats.

### § 3. ASPARAGUS

The Asparagus (*Asparagus officinalis*) is a wild plant in Essex and Lincolnshire and other parts of England, and is cultivated for the fat and fleshy young stems. These are made up into bundles, 1000 to 1700 of which can be obtained from an acre of ground, the average weight of a bundle being about 17 oz.

Asparagus has perhaps touched the popular imagination more than any other. There has been an enormous increase in the production of it in recent years, with the result to the producer that the price is reduced to half what it was. If the methods of cultivation had not been revolutionized in the direction of saving expense, to grow Asparagus now would be a losing game. The directions in an old gardening book for laying down an Asparagus bed read like laying the foundations for a castle, and indeed, even now, one meets gardening enthusiasts who talk of making an Asparagus bed as of the event of a lifetime.

The advent of keen competition quickly dismissed all such ideas to the limbo of the outworn, and along with them the 6-ft. beds with double rows, the 5-ft. beds with single rows, and the laborious spitting and spade landing of a quarter of a century ago.

The Asparagus is a sea-shore plant and prefers deep sandy soil with moisture and good drainage, such as is found in the neighbourhood of Colchester, or Hersham in Surrey. It requires warm nights and sunshine to obtain the maximum crop from the stools; such cool sunless summers as those of 1909 and 1910 mean that the stools do not exert themselves to anything like their best. The extension of the cultivation of Asparagus has taken it to soils that can in no sense be classed as ideal for it, and as the process continues it must be presumed that some success is attained. At the same time it cannot be denied that the course open to the least risk to the cultivator is to devote his energies to those crops for which the land he is working is most suited.

Asparagus, even when cultivated on modern methods, with plough instead of spade, is an expensive crop, and can only give satisfaction when done with care and judgment, and under conditions favourable to produce of good grade. First-class Asparagus still meets a ready demand; mediocre finds much competition; inferior finds itself thrown upon a cold and very critical world.



When it is determined to put down some Asparagus, the plot chosen should receive careful cleaning and good manuring for two years, the drainage should be overhauled and the bottom well broken.

**Raising the Plants, &c.**—The plants had better be raised from seed sown in March of the previous year, in drills 12 in. apart. As the seeds are a long time germinating, and when they first come through the young plants are very difficult to distinguish, it is well to mix with the Asparagus seed something like Radish or Spinach, which comes up quickly, so that the place where the drills are is marked soon enough to get one hoeing before the Asparagus is up, or weeds will be a trouble all the summer.

Good sorts to grow are *Connover's Colossal* (American), *Palmetto*, and *Argenteuil Early* (French). Four or five pounds of seed will be sufficient to plant an acre.

**Planting.**—Planting time is the end of March, when the plants should be forked out and carefully separated to single crowns. The land where they are to be planted should, after being ploughed, be barked up with the furrows open 3 ft. 6 in. apart. The bottom of the furrow should be broken with a horse hoe and then levelled.

Some crushed bones may be sown along the furrow, but no other manure should be used at time of planting.

The plants are laid in the bottom of the furrow, either with their roots spread out all round, or laid on the side with the roots all pointing the same way along the furrow. After the plants are laid in they are covered with 1½ in. of mould raked in with a hoe from the side, and then are well trodden in. The middles may now be cropped. It is well not to be too greedy in cropping the middles, or the growth of the young Asparagus plants may be checked. It is well, also, not to put in a crop that needs going over often, like Runner Beans, because then the young Asparagus runs great risk of being trampled on. The best is a crop like Mangold or Beet that does not come to harvest until the Asparagus has made its summer growth.

It goes without saying that he who would establish a profitable plant of Asparagus must make up his mind to keep the weeds down from the first. Probably as the summer advances it will be seen that some of the plants have failed to develop. A gap in an Asparagus row is an expensive thing, and it is worth going to some trouble to get these gaps filled up. A good plan is to plant something that will stand all the winter, like a Leek, in each gap, on the spot where the Asparagus plant ought to be. This is done, not for what the plants thus planted will bring in, but in order to serve as a mark that will indicate in the spring, when all traces of the Asparagus above ground are obliterated, where each gap is. Plants raised by fresh seed sown in the spring can then be easily inserted in the gaps. Some recommend planting two-year- and even three-year-old plants. It will be found better practice to plant yearling plants as described above.

The first year after planting, the mould on the Asparagus crowns can





ASPARAGUS BEING SOLD AT SMITHFIELD MARKET, EVESHAM

Photo. J. Vasey



RUNNER BEANS PACKED IN BAGS FOR MARKET

Photo. W. J. Vasey





be increased to 3 or 4 in. It must not be forgotten that an *Asparagus* crown rises as it grows, it never gets deeper than when planted.

When the year for cutting comes, all the soil that has been heaped up between the rows of *Asparagus* can be turned on to it by the plough or the fork, the hollow that was where the row is will now be in the alley, where cutters will walk. If the soil is at all inclined to be lumpy it must be fined down and left loose. Unbroken clods or large stones will cause the buds to be deflected in their upward course and make "crooks". The best way to effect this where the breadth is too great for the fork is to make a tool that will carry tines on a crooked back running on wheels in the alleys and pulled by a pony.

The soil that this process pulls down into the alleys can be put up again by running an earth plough up them with the mould boards set wide apart. Some trouble will be experienced in keeping the beds free of weeds during the summer. A great deal will be saved if the surface of the beds is left rough until the weeds are just coming through, then if a wire-toothed rake is run over them in dry weather it will fine the surface of the beds and destroy the weeds at the same time.

**Cutting.**—The *Asparagus* should not be cut until the third year after planting, and then it will be wise to pass over the smaller buds and leave off cutting early in June.

The cutting is done with a toothed knife (fig. 457) set on a shaft 12 in. long put into a wooden handle. In



Fig. 457.—*Asparagus* Knife

cutting, the object is to get the full length of the bud without wounding the crown, and without damaging the young buds that are not yet through the surface. To do this the cutter should insert his knife straight down, close beside the bud to be cut, and then, when it is well down, he should give it a twist so as to bring the toothed edge into contact with the bud, which will be severed with a few saws of the knife. The careless but frequent habit of putting the knife in nearly at right angles to the bud should be checked as soon as perceived; its result is to damage several coming buds for every one cut.

"Grass" is fit to be cut for the English market when there is 2 in. of it purply green. If allowed to get too far out of ground it quickly loses girth at the top. There is a singular difference between the manner of cutting and eating *Asparagus* on the Continent and here. There, as soon as it is greened it is considered spoilt, and so the buds are cut before they come through. It is claimed that by this practice the whole of the bud is soft and eatable when cooked, and that a finer flavour is preserved. But nothing will drive the average Englishman from the belief that his "grass" should be green, at least it will not pay the market gardener to try it. The cost of cutting is about 2*d.* per 1000 stalks.

**Grading and Marketing.**—After cutting there are several different methods of dealing with the buds. Sometimes they are sorted into "Ware", "Middlings", "Crooks", and "Sprue", tied into "hands" of twenty-five with



string or raffia, and then these hands are bound with rods into bundles of 100 or 125. Sometimes little sorting is done except to pick out "stickers" for the face, and the bundles of 100 or 125 are tied right away with rod or raffia. In either case, boxes are used to lay the buds in for tying or binding. The bundles are washed before sending away. In this process a brush is used, and care is taken to use it along and not across the buds, and so as not to move the rod. A bundle of Asparagus can soon be set loose by careless washing.

In hot summer weather it may be necessary to cut twice a day. A good, well-established bed of Asparagus will continue worth cutting from eight to ten years. A good plan two years before the time for throwing it up is to extend the time of cutting a week or ten days the first year, and



Fig. 458.—Bundle of Asparagus for Market

fourteen to twenty days the next year, finally cutting as long as anything comes worth cutting. The price of Asparagus always goes up considerably as soon as the regular time for ceasing cutting comes. Many invalids and others are willing to pay a good price for it as long as they can get it.

**Winter Treatment.**—After the haulm has quite died back in the autumn it can be cut and burnt. Then is a good time to give a coat of well-rotted manure, thirty to forty loads to the acre, which can be forked into the beds. Where the plough is used a very light furrow may be turned from each side of the row, leaving 1 ft. between the inside of the two furrows. This will be a good way of burying any autumn weeds there may be. The manure

may now be drawn on and spread up the rows. It will fall into the two furrows and on to the space left between them; this space can be forked over *shallow*, care being taken to insert the fork obliquely, so as not to wound the crowns; in the process the manure will be turned in on to the crowns and that lying in the furrows covered.

Before the buds are moulded up again in the spring they may be dressed with 10 cwt. agricultural salt and 2 cwt. sulphate of potash to the acre, or, as a variant, every third or fourth year, 2 cwt. of nitrate of potash to the acre. Some growers use a good deal of soot as a spring dressing; it lightens the land, and it is claimed retains more of the sun heat. If the winter dressing of manure is not given, 2 cwt. of nitrate of soda or sulphate of ammonia should be applied in the spring.

**Forcing.**—Asparagus is also grown for forcing. The procedure in this case is quite different. Probably no crop grown in market gardens requires so much money to be laid out before there is any return as does forced



Asparagus. This consideration, and the other, that the demand for the product is very limited, probably account for the fact that few growers attempt it. The commencement is the same as that described above for natural Asparagus. The yearling plants, after being forked up, singled, and the weak ones thrown out, are planted in ground that has been kept well manured for several years, in rows 2 ft. apart, and 15 in. from plant to plant. They are either laid in the furrow as the land is ploughed or planted in cuts made with a spade. In either case, after planting, the ground is well firmed around them with a roller or the feet. After this there is nothing else to do but keep the crop clean during summer, and clear the old haulm away in the winter, for three years. Then the crowns are either ploughed out or dug out and laid in forcing beds heated either with hot water or manure. Boxes and lights are put over them, and fine soil is sifted to a depth of 6 to 8 in.

When the buds of Asparagus come through they are gathered by forcing two fingers into the soil beside the bud and breaking it out of the crown. The buds are tied in flat bundles and washed for market. "Ware" makes 4s. to 7s. per bundle and "Sprue" 1s. to 1s. 6d. Its season is latter end of February, March, and early April. [W. G. L.]

The large area of land—estimated at about 1000 ac.—devoted to Asparagus, and its average value per acre, justly entitles it to precedence over other crops of vegetables grown in the Evesham district. It is hardly too much to say that about 500 ac. have been devoted to Asparagus during the past twenty years, the period during which the writer has periodically and systematically visited all the districts in the county of Worcester in the work of the advancement of horticulture.

Asparagus is grown commercially in Worcestershire, in almost all cases, in single rows at about 3 ft. 6 in. apart; no "beds" of the private-garden type are to be seen, and double rows—which were rather plentiful upwards of sixteen years ago—are now difficult to discover. No special preparation of the soil is made, or required, for this crop. Sometimes the seed is sown where the plants are to remain; by this procedure a little time is saved. But more commonly young plants, one year old, are taken from the seed bed and planted in rows as stated, and at 18 to 24 in. apart in the rows. It is not generally known that much depends upon the care exercised in the selection of the young plants to be planted permanently; and in this respect the men of Evesham are *not* in advance of good Asparagus cultivators elsewhere. The seedling plant varies in character, and whatsoever its character in infancy, that it retains to maturity and senility. In other words, it is the nature of some young Asparagus plants to produce *numerous but thin* shoots, and they will always retain that nature no matter how cultivated. Other young Asparagus plants, *from the same seed-bed*, produce *fewer but strong or thick* shoots, and this they will do to the end of their days, other conditions being equal. Therefore, in order to have a crop of *large Asparagus* the main thing is to select and plant only those seedlings which produce few and strong shoots even as seedlings; but if a *good*



average quality of asparagus be desired, then select and plant the above-mentioned and those next in strength, and producing one or two more shoots. If a mixed crop—strong and weak—of *Asparagus* is preferred, then plant the seedlings without any selection or separation of weak from strong.

Like all other plants, *Asparagus* fails in vigour after a certain time, and this depends upon circumstances. As its full vigour is generally attained at the third or fourth year after planting, it usually produces remunerative crops during the following five or six years. Then a marked loss of strength becomes apparent, new plantations are made, and the old beds “burst up”—to use a local but expressive term—after about two or three more years. So there is a constant succession of plantations on the best-managed grounds, following each other in rotation of five or six years.

The rows being planted at, say, 3 ft. 6 in. apart, other crops are taken from between the *Asparagus* during the first two years. These crops during the first year are Dwarf Beans, Onions, Lettuce, or Cauliflowers; during the second year they may be Lettuce or Radishes—something that is dwarf, arrives quickly at maturity, and is cleared from the ground before the “bower” of the *Asparagus* becomes so tall and dense as to spoil the catch crop. The third year, cutting commences in earnest, and the *Asparagus* pays for itself, and the ground is given up entirely to its cultivation.

The subsequent routine of culture consists in the annual manuring or feeding of the crops—which at Evesham largely consists of soot; moulding up into ridges early in spring with pulverized soil over the crowns of the plants before growth commences; covering the crowns with soil to a depth of 4 to 8 or more inches (the largest *exhibition* *Asparagus* is usually moulded or “earthed-up” to a depth of 12 in.); and the annual cutting down of the *Asparagus* in November, together with the levelling of the soil which had been placed over the *Asparagus* in spring. [J. U.]

**Pests.**—The principal enemy of the *Asparagus* that the grower must look out for is the *Asparagus Beetle* (fig. 459). The little black-and-yellow “cross-bearing” insects, as they are called from the appearance of the markings on their wing covers, can be seen on the feathery haulm when it has grown up.

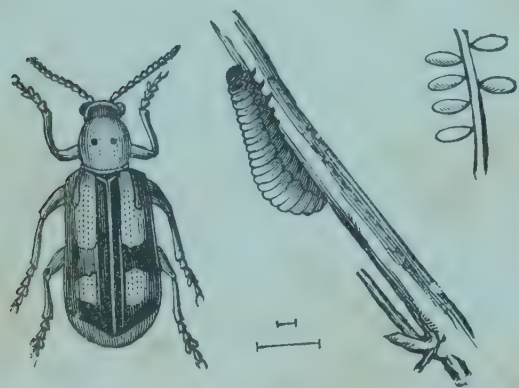


Fig. 459.—*Asparagus Beetle (Crioceris asparagi)*, Larva, and Eggs (all magnified). Natural length of egg and beetle shown by lines

The pest does damage to the buds as they come through by biting, causing them to “crook”, and covering them with slime and eggs. Spraying the haulm after cutting is over with a poisonous spray, dusting the buds during cutting with slaked lime, and allowing a bud

here and there to grow up as traps, to be cut off and burnt as soon as the eggs can be seen upon them, are good measures for dealing with the pest.

## § 4. BEANS

**The Broad Bean** (*Vicia Faba* or *Faba vulgaris*).—The Broad Bean is an annual supposed to have been introduced originally from Egypt. According to the *Standard Cyclopædia of Modern Agriculture*, nearly 600,000 ac. of land were devoted to Bean culture in 1873 in the British Islands. In 1897, however, the area had dropped to 230,000 ac. Ten years later, in 1907, the figures rose to 311,000 ac. Beans are grown but very little in Ireland or in Wales, and only 12,000 ac. are returned for Scotland. England, with 296,000 ac., therefore grows about 95 per cent of the total Bean crop. Of this more than three-fourths (76 per cent) is grown on the eastern side of the country, the counties of Essex, Suffolk, and Lincoln alone accounting for over 100,000 ac. The average yield of seeds of a Bean crop is quoted as  $29\frac{1}{2}$  bus. to the acre.

The Broad Bean is a crop that is favoured both by farmers and market gardeners—the latter chiefly growing the plants for the pods, the former for the corn or stems and the ripened seeds. Owing to the fact that the Broad Bean is a strong grower, and, like other leguminous plants, possesses the remarkable power of securing free nitrogen from the atmosphere and storing it up in the bacterial nodules on the roots, it may be grown to advantage in comparatively poor soil. This will be rendered richer in nitrates for a crop of a different nature. If the stems and leaves are dug in they will act as a very excellent manure when decomposed, and yield up a supply of nitrates, potash, lime, and phosphoric acid. Indeed, the estimated value of manure obtained by the consumption of 1 ton of Bean stems of average composition amounts to about 15s. at current unit prices. The ash contains 30 to 35 per cent of potash, 20 to 25 per cent of lime, 5 to 8 per cent of phosphoric acid, and 2 to 4 per cent of silica.

There are no published figures as to the yield of pods from Broad Beans, but the following notes made by the writer may be useful. Taking 50 plants, 1 ft. apart every way, the average number of pods to each was 20, and each pod average 4 seeds, making 80 for each plant. In a fresh state 70 of these seeds weighed 8 oz. without the pods. As these would weigh at least another 8 oz., it may be taken that the average yield from each plant would be 1 lb. Reckoning 30,000 plants to 1 ac., the gross yield would be about 13 tons of pods to the acre, and as many more for stems and leaves. An average crop under market-garden culture, however, is from 7 to 8 tons of pods per acre. The average prices for Broad Beans in July and August vary from 2s. to 3s. a bushel, but drop down later on to 1s., although in exceptional cases the prices occasionally rule much higher and lower. [J. W.]

For market-garden purposes the first to consider is the *Long Pod*, which can be planted in early November on warm soil. If shelter is available it will help; if not, it is a good plan to put the land up in balks or ridges running east and west, and to plant the Broad Beans along the south side



halfway between the bottom and the top. The distance between the rows should be 21 in. or 2 ft., and between the plants 4 or 5 in. The best sort for this work is the *Seville Long Pod*, and care should be taken to have seed that has been saved in Spain, for it is a strange thing that none other does so well. In spring the balks or ridges can be hoed down around the

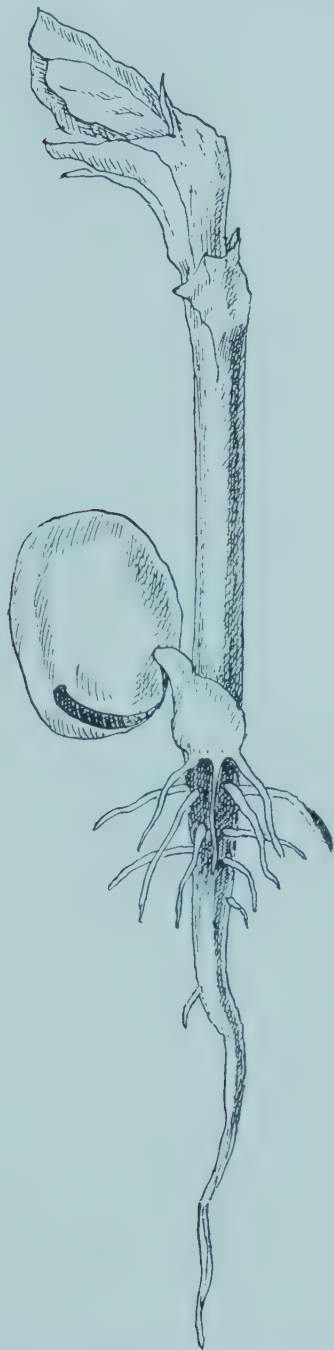


Fig. 460.—Broad Bean-germinating



Fig. 461.—Broad Bean in Flower and Fruit

plants, and provides a useful shanking up to them—in other words, a support to the stems. In February small sowings of other Long Pod Beans can be made on the flat in rows 2 ft. apart, and for the main crop the *Windsor Broad Bean* will give satisfaction. As the Broad Bean does not require the land in a high state of cultivation, it may be regarded by some as a farmer's crop, yet it is grown by market gardeners too. [W. G. L.]

**The Runner Bean** (*Phaseolus multiflorus*).—Although cultivated as

an annual, the Runner Bean is really a perennial plant, and produces large Dahlia-like roots. It is a native of South America, and like its cousin, the Dwarf or French Bean, is much more tender than its other relative the Broad Bean. Owing to the expensiveness of staking, market-garden and farm cultivation does not really bring out the capabilities of a Runner Bean crop. A few years ago, by growing 66 plants 1 ft. apart in a row 70 ft. long, running north and south, 312 lb. of edible pods were picked—just under 5 lb. to each plant. As 7000 plants 1 ft. apart, in rows 6 ft. asunder, could be got on an acre of ground, it would be possible to obtain from 30,000 to 35,000 lb. of pods to the acre. The usual crop averages from 10,000 to 13,000 lb., while the stems and leaves weigh a little more than half. [J. W.]

The Runner Bean is a crop grown by cultivators who would style themselves farmers more than market gardeners, yet it can be claimed as a market-garden crop. Sowings are made in May in drills 2 ft. 6 in. or 3 ft. apart. Most market gardeners will have a crop already in the ground on which the Runner Beans are planted. At one time the Beans were planted 5 ft. from row to row and staked. This plan has now been abandoned in favour of placing the rows closer together and stopping the twining stems by frequently pinching off the tops. It is curious that a German grower visiting this country in the summer of 1910 expressed himself as most struck among all the things he saw on a market garden by this plan of stopping Runner Beans. [W. G. L.]

A large area is devoted to this crop in the Evesham district. Seldom do late Runner Beans pay for sending to market, though the cause for that is somewhat mysterious; because it is a common experience to learn that the public cannot obtain Beans for love or money in September—unless they themselves grow them—yet the Beans realize nothing if sent to the wholesale market. Such being the case, the grower's chief objective is earliness. Early Runner Beans are valuable, and some risk is deliberately incurred in order to obtain an early supply of pods. Not only are warm positions given the crop, but seed is sown very early, so early, that the plants are through the soil long before there is likely to be any immunity from frost; but their destruction or injury is risked. Often the risk has been successful, particularly in positions not too low; but Beans in the latter positions are frequently injured.

Sowing takes place at the end of April and beginning of May; and the Beans are sown in rows at 3 ft. apart. To the ordinary reader this distance suggests a serious error; but in the market gardens of Worcestershire generally, sticks are not used to Runner Beans, they are kept dwarf by systematic topping—weekly at first—directly the plants commence to extend their shoots in search of support. A few growers do use sticks, but they are in a very small minority. As bean sticks are nearly always expensive, and in some places unobtainable, their cost is thus saved, and so is the time that would have been required to fix the sticks in the ground in summer and their removal in autumn. By the regular topping, to which



allusion has been made, the Beans are kept within the 3 ft. allotted to them. Which of the two systems will prove the more profitable largely depends upon the *local* demand for Beans and the supply of sticks. In the market-gardening districts the sticks are not used. [J. U.]

**The French or Kidney Bean** (*Phaseolus vulgaris*).—This was introduced from South America, and is now extensively grown all over the civilized world. As a rule, the seeds are sown too thickly, with the result that the crop suffers. By sowing in drills 2 ft. apart, with the plants 1 ft.



Fig. 462.—Kidney Bean—Sutton's Perfection

from each other, about 14,000 plants would go to the acre. Taking the average yield of pods from each as weighing  $\frac{1}{2}$  lb. this would give 7000 lb. to the acre. As a matter of fact, as much as 10,000 to 12,000 lb. per acre may be obtained by a little extra attention to hoeing between the plants. Early supplies will realize from 3*d.* to 6*d.* per pound, but later on in the season perhaps only  $\frac{1}{2}$ *d.* or 1*d.* at the most can be secured. Where a grower has a supply of bell glasses or cloches at his disposal he might utilize them to good advantage to bring on the plants to earlier maturity, and thus secure the higher prices. [J. W.]

French or Kidney Beans may be claimed without question as a market-garden crop. Sowings are made in succession from early May to July in rows 2 ft. apart. Several sorts are favoured—the *Early Dun* (for first

sowing), the *Canadian Wonder*, the *Negro*, and the *Butter Bean*. The latter is a distinct variety, only lately taken up by growers in this country. Its peculiarity is yellow pods, which are not sliced up for cooking, but are cooked and served up whole.

In all varieties of French Beans the utmost watchfulness must be exercised to gather them while young; a few poddy, stringy ones will condemn a whole parcel and get the grower a bad name, from which he will find it hard to emancipate himself for the remainder of the season. [W. G. L.]

**French Climbing Beans.**—Some market growers favour Climbing French Beans for an early greenhouse crop. The seeds are sown in February or March, in 8-in. or 10-in. pots, or in nicely prepared soil in the greenhouse beds and borders. One of the most important features of cultivation is to keep the temperature of the house up to about 75° F. The temperature should not fall much below 70° F. at night, nor be allowed to rise much above 80° F. by day. Great care also is taken to keep the atmosphere in a fairly humid condition. This is secured by giving copious supplies of water when the soil is evidently in need of it, and also by syringing the foliage two or three times a day, especially during genial weather. Tender pods realize anything from 6d. to 1s. per pound in a favourable market. As a rule the crop is over in June or the first week in July. One of the best varieties to grow is Veitch's Climbing French.

Red Spider is kept in check by a moist atmosphere. Plenty of light should be given, and the ventilation should be regulated according to the state of the outside weather. [J. W.]

## § 5. BEETROOT

The Beetroot (*Beta vulgaris*) belongs to the same family as the Spinach, but is grown for its tap roots in market gardens. It is a somewhat exhaustive crop, and from 12 to 16 tons of roots may be regarded as a fair yield to the acre. The leaves, &c., will weigh about as much, and if not used as food for cattle will form a valuable manurial dressing. The amount of plant food taken out of an acre of the soil by 12 tons of Beetroot has been given as follows:—

			12 tons of Roots.		12 tons of Leaves.
Nitrogen	...	...	40·5 lb.	.....	105·60 lb.
Magnesia	...	...	18·9 „	.....	68·64 „
Phosphoric acid	...	...	27·0 „	.....	39·60 „
Potash	...	...	94·5 „	.....	155·76 „
Lime...	...	...	183·6 „	.....	429·12 „
Total	...	...	<u>364·5 lb.</u>	.....	<u>798·72 lb.</u>

A soil rather heavy in texture but well and deeply worked, and well manured and limed, gives excellent results. Too much manure is apt to induce coarse and unsaleable roots, but a dressing of lime will help to rectify this



This crop is valuable to the market gardener for the two reasons, that it provides a change to his land from the crops liable to club and because it can be stored for winter trade. Beetroot likes well-manured, friable, fresh and deeply moved soil. It is a capital crop to put in after spring greens, provided the organization is capable of getting it in sharp, without losing time. The plough and the drill should follow the cutters the same or, at latest, the next day. Beet is sown in drills  $1\frac{1}{2}$  in. deep and 1 ft. apart. The quantity of seed required to sow an acre, so as to make as sure as possible of a full crop, is 20 lb. A sowing of 5 cwt. of salt to the acre before the seed is sown is considered a good thing, but stable manure should not be used immediately before sowing Beet, because it is apt to encourage the formation of "chumps".

Medium-sized Beet are most in favour in the London market, and growers should fight shy of sorts with a family likeness to the Mangold. One of the best Beets is the *Cheltenham Green Top*, although when this has been saved too near a field of mangold seed there are many among the roots too coarse for anything but the cow byre. To make sure, the grower should save his own Beet seed. Let him pick out shapely medium-sized roots in February or March and plant them in good soil, covering the top with 2 or 3 in. of soil until the period of spring frosts is past, then raking it off. One hundred roots ought to produce enough seed to sow 1 ac.

When grown, a crop of Beet is stored in pits or clamps in the same manner as mangolds. The roots should all be clamped by the end of November. The clamps should not be made too large, and should have a good covering of mould over a layer of clean straw. When the Beet is kept right into the spring, holes along the sides of the clamps should be made as soon as the time for growing induces the roots in the clumps to make new tops, or else heat will be engendered and many roots be spoiled. [W. G. L.]



Fig. 463.—Tall Scotch Kale

## § 6. BORECOLE OR KALE

What is popularly known as the Scotch or Curly Kale is a useful hardy winter vegetable, sown in seed beds in April or May, and can be planted out up to middle August. It can be sent to market as soon as cold weather whets the public appetite for green vegetables, and its season

lasts until Turnip tops and Spring Greens oust it. It is especially useful when Spinach is scarce, and the leaves of good curled sorts have been used for garnishing when Parsley has been dear. In selecting seed a good dwarf curled sort should be chosen. Let the market grower fight shy of the mongrel abominations sold as "Cottagers' Kale". [W. G. L.]

## § 7. BROCCOLI

The Broccoli (*Brassica oleracea botrytis asparagoides*) is closely related to the Cauliflower, but is hardier. The white or creamy-headed varieties are frequently mistaken for Cauliflowers, but they appear at a season of the year when the Cauliflower proper is under protection.

On well-worked grounds from 10 to 16 tons of heads of Broccoli may be secured from an acre of ground. The individual heads will weigh from 2½ to 3 lb. each, and as many as 10,000 heads can be obtained from a similar area. To secure the best results the soil must be deeply cultivated and heavily manured. Broccoli, being gross feeders upon the potash, lime, and phosphoric foods in the soil, tend to impoverish the land. These foods should therefore be supplied by well-rotted stable manure and dressings of 4 cwt. of kainit, or 1 cwt of sulphate of potash to the acre, especially if the land is naturally light. In heavy soils, well and deeply worked, there are inexhaustible natural supplies of potash, and in such cases a dressing of superphosphate—4 to 6 cwt. to the acre—would be better. A dressing of lime on land that has been previously heavily manured is highly beneficial.

Broccoli must be considered under the heads of White and Sulphur-tinted Section, Purple Section, and Sprouting Section.

*Veitch's Self-protecting* is a good white Broccoli which comes in after Autumn Giant Cauliflower. The leaves fold over the head, protecting it against the effects of frost if it does not come too severe. In fairly mild weather it will last till Christmas. In the White and Sulphur section come the spring varieties, seed beds for which are made in May and plantings in July and August. These heart in during May. They will weather any but abnormally hard winters. Sometimes additional protection is given to the heart by turning the rows towards the north, either with a plough or by digging soil away from the north side. This serves to protect them from the early sun after a frost, and the leaves lie over the heart. The process always has the effect of somewhat checking the growth. The chief place in England for this class of Broccoli is Penzance, where the plants come in earlier than anywhere else, Cornish heads having made quite a name for themselves. This class of Broccoli is cultivated with success, however, in other parts of England and in Scotland.

In the Purple Section the chief is the *Purple Cape* (fig. 464). There are two varieties, the Early and the Late. These are very old varieties of Broccoli, formerly much more cultivated than now, the Autumn Giant



varieties having introduced too strong a competition with them, especially as regards the Early Cape variety, which comes in during September and October, and may be said now to be out of cultivation. The late Purple Cape variety, which begins to turn in about Christmas time, and continues, according to the clemency of the season, to come on till April, has many among the public who are fond of it. Seed beds should be made in May, and plantings up to middle August at a distance of 2 ft. 6 in. by 21 in. Cape Broccoli is sometimes sent to market docked in the same manner as Cauliflowers. It looks very pretty tied in bunches. For this purpose the outside leaves are bent back to form a handle, while the inside leaves are clipped close to the flower.

Bunches are made consisting of six, eight, or twelve heads, according to size, by laying them over a stiff rod, with the heads level at the face. If the different tints in which the flowers come are well mixed the effect is attractive.



Fig. 464. —Broccoli—Purple Cape

Heads make 1s. 6d. to 2s. per dozen. Bunches, 9d. to 1s. [W. G. L.]

The "Cabbage Broccoli", or "Chou de Burghley", is said to be a cross between a Cabbage and a Broccoli. It can be used as a Cabbage in winter and as a

Broccoli in Spring, if allowed to mature the heads. Seeds are sown in April and May. It is not a market crop.

## § 8. BRUSSELS SPROUTS

This highly esteemed vegetable (*Brassica oleracea bullata gemmifera*) owes its name to the fact that it was first grown in the gardens round Brussels some five or six hundred years ago.

The Sprouts, which are a carefully developed abnormality of the Cabbage, are now one of our principal winter vegetables, grown in great quantities all over the kingdom. A feature of the crop is that it does not require the land to be too rich. If it is, the stem grows lanky, the Sprouts become soft and inclined to be open. They are frequently attacked by Greenfly in late summer, which causes the outer leaves of the Sprouts to first turn yellow and then go rotten. In London, medium-sized, hard, dark-green sprouts are favoured; in the Midlands the taste runs to larger ones and is not so particular about their being a little ripe.





CELERY BEING SOLD IN COVENT GARDEN MARKET



BRUSSELS SPROUTS AS SENT TO MARKET

Each basket contains half a bushel

Photos. W. J. Vasey





Some growers make sowings in August or September in order to get early plants for the spring planting, some even going the length of using glass for the purpose. Sowings made, however, in February or March and planted out on the first opportunity in May will produce Sprouts early enough for most seasons, for few people would care to put sprouts on their menu while the weather is hot, and beans and cauliflowers are in full swing. Other growers sow the Brussels Sprouts in drills to thin out, and utilize the middle to get a crop of Lettuce or Spinach while the Sprouts are growing. There is a good deal to be said for this plan, because it gets the Sprouts in quite early enough, while in a dry summer it makes sure of one principal crop of winter greenstuff, and eases the anxiety the market gardener must always have in summer until he sees his winter crops well established.

Brussels Sprouts should have plenty of room, 3 ft. by 2 ft. 6 in. being a good distance on good land. For the London market the practice among growers in the neighbourhood of London is to send the Sprouts to market in half-bushel baskets, with the tops rounded over with Sprouts neatly placed side by side with the stalks under. The growers of Bedfordshire and Worcestershire send their Sprouts in hampers and pots without going to the trouble of topping. The cost of picking and topping a half-bushel of Sprouts is 3d.; the price, 1s. to 2s. 6d.; and the product of an acre about 200 half-bushels.

The "tops" are sometimes saleable in late winter, and make about 6d. per bushel; 150 bushels may be got off an acre. The stumps of the Brussels Sprouts, after the Sprouts are all gathered, make valuable food for stock, either sheep or cattle.

[W. G. L.]



Fig. 465.—Brussels Sprouts

## § 9. CABBAGES

The many varieties of Cabbage have been evolved from the wild *Brassica oleracea*, a Cruciferous weed found growing wild on the sea cliffs of the south-west of England and Wales, the Channel Islands, &c. As a farm and market-garden crop it is generally cultivated throughout the British Islands. The Returns of the Board of Agriculture for the year 1911 show that 58,092 ac. of Cabbages are grown in England, 6302 ac.



in Scotland, and 785 ac. in Wales, making a total for Great Britain of 65,179 ac. Something like 40,000 ac. are devoted to the Cabbage crop in Ireland, making a round total of 105,000 ac. for the United Kingdom. In England the largest Cabbage-growing counties are: Essex, 4964 ac.; Kent, 4722 ac.; Devon, 3425 ac.; Lancaster, 2834 ac.; Hampshire, 2738 ac.; Sussex, 2630 ac.; Cornwall, 2437 ac.; Derby, 2004 ac.; Middlesex, 1998 ac.; Bedfordshire, 1971 ac.; Norfolk, 1968 ac.; and Suffolk, 1927 ac. Worcestershire and Staffordshire both have over 1800 ac. each, and about a dozen others are credited with an area of 1000 ac. or over, Middlesex is the largest Cabbage-growing county in proportion to its size, about 1 ac. in every 90 being under the crop.

In Ireland, Munster is the largest Cabbage-growing province, with over 16,000 ac., Leinster and Connaught are close together with over 8000 ac. each, and Ulster has over 6000 ac. Amongst the counties, Kerry leads the way with over 4000 ac.; then come Cork, nearly 4000 ac.; Tipperary, about 3500 ac.; Galway, 2500 ac. nearly; and Mayo, Limerick, and Donegal, each with over 2000 ac. in the order given. According to the Irish figures, the average yield of Cabbage works out at just over 10 tons to the acre.

From the analysis of the ash given in Vol. I, p. 109, it will be seen that the Cabbage—and indeed its relatives, the Cauliflower, Turnip, and Kohl-rabi, &c.—are all great feeders on the available potash in the soil, from 31 to 50 per cent of the ash being composed of this food. Lime, phosphoric acid, and sulphuric acid are also absorbed in fair quantities, and indicate that the soil must be well and deeply worked to bring them into a proper state of solubility. [J. W.]

In some respects the Cabbage may be called the market gardener's staple crop. Some have gone so far as to nickname him a "cabbage grower". The Cabbage, in some form or another, is with him all the year round; as a finished product it is on his stand ten months out of the year. The Cabbage is a gross feeder, and to produce it with well-developed heart, succulent leaves, and clear green colour without blue requires deep cultivation and liberal but judicious manuring.

**Spring Cabbages.**—In following the cycle of the Cabbage year, it will, perhaps, be the more convenient to commence with the preparation for the autumn-planted, spring-gathered Cabbage. The preparation of the seed bed for this is perhaps one of the most anxious and important operations of the year. The weather in late summer is often so treacherous that a good Cabbage seed bed is sometimes the most eloquent testimony to the cultivator's skill, perseverance, and resource.

A very good plan is to keep some land, from which a crop has been gathered in June, fallow for the seed bed.

Fallow does not mean leaving the land a happy hunting ground for weeds. The object of the fallow is to conserve the moisture. This can only be done by persistently killing all weed growths as soon as they show themselves and before they can draw any moisture from the land. A Bentall's Scarifier, or a Martin's or other cultivator, or any broad share

run lightly over the land, so as not to disturb the surface to a greater depth than 2 in., will accomplish all that is needed in two or three applications.

The last day of July or the first day of August is the time to sow the first season. Some growers commence sowing as soon as the middle of July is passed. The result is that their plants want moving long before it is time, or their land is ready, and when they are planted they are lean, lanky specimens, with a poor chance of weathering the frosts and snows of a hard winter. Unless, indeed, the soil of the seed bed is so poor that the plants cannot grow, then the early sowing will have less to condemn it, and the plants will be hard and woody.

Experience proves, however, that though plants off moderately poor land do better than those raised where richness has produced a soft, sappy growth, yet plants that are too much stunted are like cattle starved when young: they take a long while to come round. Another bad effect of sowing too early is that many of the plants bolt in the spring, and though the bolters can be pulled out and sold in the early weeks, the labour involved and the poor price received together constitute a severe penalty to pay for the early sowing. If the sowing is done broadcast, the seed should be distributed evenly and not so thickly but that there will be space enough for the plants to get to a decent size without drawing each other up. This practice, perhaps on account of the added difficulty of hoeing, is going out in many places in favour of drilling. Where this latter is the plan followed, the drills should be fairly close together and the seed not too thick in the rows. One sees sometimes a seed bed with the rows almost 1 ft. apart and the plants in the rows almost as thick as mustard and cress. What advantage there can be in such a method is difficult to see. Perhaps the only reason the grower himself could give is that one which ought surely soon to be heard less of in the agricultural world, viz.: "Because my father did before me". Not that any of us should condemn the practical wisdom of our ancestors on the land. They managed in very many things—by the process of observation and the garnered store of experience, contributed to by generation after generation—to hit upon right methods, the reasons for which scientific investigation and inductive reasoning are only now discovering. What *is* to be condemned is the habit, so common, so indolent, and so pestilent, of doing things simply *because* they have been done before, without any independent enquiry for the why and the wherefore of them.

In a seed bed you want to raise the largest number of plants possible in a given area. True; but if in trying to do this you make one-half so drawn up as to be hardly worth planting, and the other half not worth pulling, what have you gained? Your wiser plan manifestly is to have your plants evenly distributed and not so thick anywhere but that they will be short and squat, and thus start off with more than a sporting chance that they will survive a stiff winter. The earliest pullings of plants are generally planted 12 in. by 12 in. to come for spring greens. After this



some 15 in. by 12 in. may be planted to come a little later, many of which, if the right sort has been sown, should make spring Cabbages.

After this later plantings may be made at 18 in. by 15 in., and 20 in. by 16 in. for the main crop of summer Cabbage.

The best sorts for the August sowing are: *Early Offenham*, *First and Best*; *Early Market*, *Mein's No. 1*; and for late plantings, *Enfield Market*.

**Spring Sowing.**—For early autumn cutting in August and September a sowing of *Nonpareil* in March, to be transplanted in May, is useful. After this comes the *Colewort* season, called in the trade "Collards". Seed beds may be made in April or May for transplanting in June and July, or sowings in drills for a crop to stand after being singled during June. Judgment must be used for getting these crops out. Summers are often unreliable, and it is a difficult matter, with all that must be done during June and July, to make sure of the moisture, when there happens to be any, before it has dried up. It is no use getting winter Colewort crops out so that they all hearten in September. The grower wishes to arrange, if he can, so that they keep turning in all the winter, finishing up as greens just before spring. The *Christmas Drumhead* Cabbage, which was introduced a few years ago, is a most useful variant to the Colewort, and the cultivations for it are the same. [W. G. L.]

**Red Cabbage.**—Those growers who deem it wise to grow as large a variety of crops as possible will not neglect this pickling vegetable. It has the disadvantage of being liable to "club", like the other members of the Cruciferae, and should not be grown without taking precautions against this pest (see Vol. I, p. 209). Some raise their plants by sowing in the autumn, but inasmuch as few want to start pickling until the season of jam-making is quite over, it will be found that March sowings will be early enough, besides giving less trouble. The plants should be put out 2 ft. 6 in. by 18 in. on well-manured land. Red Cabbages, marketed in good condition, make from 1s. 3d. to 1s. 9d. per dozen. [W. G. L.]

The Cabbage is an important crop in the Vale of Evesham, and practically an unvarying one. It is also a most striking one in the months of February, March, and April; after which few Cabbage are to be seen in the district. Myatt's "Early Offenham" is almost exclusively grown. To see hundreds of acres of this Cabbage, just before cutting commences at the end of February or early in March, is a striking experience, especially when annually repeated during many years. It says much for the quality of the strain in the first instance and for the care exercised to preserve its purity through two generations. Other varieties have been tried, but they have had to yield to the superiority of "Early Offenham" for commercial purposes. The writer has tested all the best-known varieties against it, but none have equalled it for *all* good qualities.

Seed is usually sown broadcast in large beds during the first half of July, immediately after rain or immediately after the seed bed has been specially and well soaked with water for the reception of the seed. The





Photo C. W. Rutter

PACKING "EARLY MONARCH" CABBAGES

At Mr. J. W. Cross's Farm, Wisbech





question of a moist seed bed is all-important with regard to the "bolting" of Cabbage, as well as many other things.

Cabbages usually follow early Peas or Radishes or Marrows. They are planted at the end of August and through September, thus becoming thoroughly established and well advanced before the winter, which is very important in the cultivation of early Cabbage. As the cabbages are cut when the "hearts" are a nice size but not *fully* grown, the plants do not require so much space; therefore they are planted more closely together than they would be planted for summer or autumn use; in fact, about double the number are planted per acre. Usually these Cabbages are planted in rows 14 or 15 in. apart and 12 in. apart in the rows. The earliest are planted on warm borders and in other warm and sheltered places. They are carefully hoed in autumn and again in February, when they receive their dressings with fertilizer to hasten their growth. Fish guano, nitrate of soda, or a combination of nitrate, kainit, and superphosphate (mixed and applied immediately) are used, the last-named mixture giving a splendid colour and flavour to the cabbage. After April it seldom pays to send cabbage to market; but the earliest cabbages usually realize 3s. to 5s. per "pot" or bushel, therefore all efforts are directed to the early development of the crop. [J. U.]

**Cabbages under Glass.**—Where large unheated greenhouses exist, some growers utilize them during the winter season for a crop of Cabbage. The seeds are sown in August, and the plants are ready to be put in during October and November, so as to be off by the middle or end of March. About 1½ lb. of seed is required to produce enough plants (40,000) for an acre of ground, the plants being placed about 1 ft. apart every way. During the winter, however, every alternate one, if large enough, is pulled and sold as "greens", thus leaving about 2 ft. of space between the Cabbages that are to heart up later on. A good variety to grow under glass in this way is Hurst's "First and Best", nice heads of which will often realize 1s. 6d. per dozen. It is not such a good variety for the open air, as it sometimes rots at the base of the head, and this is not noticed till cutting takes place. [J. W.]

**Savoy Cabbage.**—This, like Scotch or Curly Kale,

is a useful hardy winter vegetable which wants sharp weather to make it palatable. The seed bed for Savoys should not be made before May, for it is of no use getting



Fig. 466.—Savoy—Perfection



them in early in the autumn; they will only burst before there is any demand for them. Plantings should not be made later than July, or they will fail to heart in, and nowadays there never seems to be any demand for Savoy Greens. Savoy require planting 2 ft. by 18 in., so that 14,500 can be got off an acre. The Savoy is one of the most useful crops for cleaning dirty land. Its leaves keep so close to the ground, it spreads so rapidly, covering the surface so completely, that the most hardy lived of nature's indigenous growths are compelled to succumb to the suffocation.

Savoys are frequently sent to market stacked loose on the van or wagon. This affords an opportunity of discussing a practice which ought perhaps to have been dealt with under the head of "Cabbages".

Is it possible to contemplate the world around us without coming to the conclusion that a constant process of refinement is going on in the public taste, and in the demands it makes on those who cater for it? In every branch of commerce this tendency has been recognized by efforts to render products more attractive in appearance. Pains and expense have not been grudged to enhance the appeal which they make to cultivated taste. The results of efforts in this direction made by exporters of fruit and vegetables to this country from the continent of Europe and elsewhere lie deeply marked on the trade of our markets. Is it to be expected that the home market gardener alone will profit by ignoring this tendency, which every other class of producers recognizes? Will it pay him to persist in a practice which is contrary to hygienic laws, is repulsive to refined taste, and ensures that his produce shall reach the consumer much in the state in which a vessel, battered by wintry storms, drifts, a wreck, into port? Already premonitory growls have appeared in the public press, and wisdom surely lies in the direction of voluntary reform, which the widespread adoption of cheap boxes in place of baskets has made comparatively easy.

[W. G. L.]

## § 10. CARROTS

The Carrot has been developed from the wild British *Daucus Carota*, a hardy biennial of the Umbellifer family. As a farm and market-garden crop it is highly valued for its taproots, the coarser and larger roots being used for cattle food, while the shorter and more highly flavoured kinds are preferred for human use. As a farm crop over 11,000 ac. are cultivated in Great Britain, the principal Carrot-growing counties being Cambridge (over 2000 ac.), Lincoln (over 1500 ac.), and Bedford (about 1000 ac.).

The soil for Carrots should be deeply cultivated, and be of a sandy loam. Rough cloddy soil is quite useless, as the roots like to be closely packed round with a nice rich friable mould into which they can penetrate without much trouble. Manure is best applied in the autumn, especially if only partially decayed, as heavy manuring in spring is apt to develop coarseness and irregularity. On the other hand, the lack of well-decayed manure or humus will be a great drawback, especially during dry hot

summers, when the roots will begin to crack and split owing to the absence of moisture in the upper layer of soil.

For early crops the Shorthorn and stump-rooted varieties, like "Early Shorthorn" (fig. 467), "Early Market", "Early Nantes", &c., may be sown in drills about 6 in. apart in February on warm, sheltered borders, afterwards thinning the young plants out to 3 or 4 in. apart. In this way over 300,000 plants would go to the acre. The crops should be cleared by the end of May or early in June. Maincrop varieties, like "James's Intermediate Scarlet" (fig. 468), &c., are sown from March to the end of April, and still later the "Long Surrey Red", but more space is required for these. About 20 tons of carrots may be secured from an acre of land under ordinary methods at a cost of about £10 per acre, but with more intensive methods as much



Fig. 467.—Carrot—Early Shorthorn



Fig. 468.—Carrot—James's Intermediate

as 40 tons may be looked for, even with intermediate varieties. It will pay to use the hoe early in the season, not only to keep weeds down, but also to encourage quicker and more succulent growth, and to liberate the supplies of potash, phosphoric acid, and lime, which are taken up so largely from the soil.

Where large supplies are grown for winter use it is usual to store the roots in the same way as Beetroot, in clamps, from which they may be drawn as required.

Carrots are often attacked in badly cultivated soil by wireworms, leather-jacket grubs, &c., which infest the roots and destroy them. Such ground pests are best got rid of by deep cultivation and the aid of birds, and by dressing the soil a few weeks in advance of sowing with kainit at the rate of 4 or 5 cwt. to the acre. The Carrot Aphis is likely to be troublesome in weedy soils, and may be checked to some extent by the



application of soot to the foliage after a shower of rain or a heavy dew. By keeping the ground well tilled and free from weeds these pests will, however, be reduced to a minimum.

## § II. CAULIFLOWERS

This curious vegetable (*Brassica oleracea botrytis cauliflora*), developed from the deformed inflorescence of some variety of the Cabbage or Kale, was known to the Greeks and Romans, but was not introduced into this country till the seventeenth century. So rapid, however, was the extension and perfection of the culture here that, by the French Revolution, there was a large export of Cauliflowers from this country to Holland.

It is only from countries where their more southern position gives them an earlier spring that any importations to this country come. The Cauliflower must be distinguished by the grower from the Broccoli, which is a near relation and bears a close resemblance to it, but in flavour is less delicate, and in constitution is hardier and more robust.

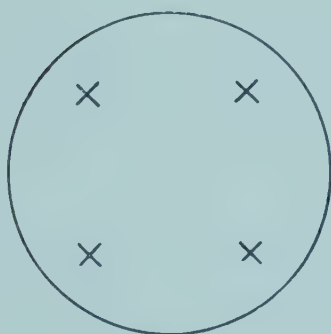


Fig. 469

**First Crop.**—The culture for Cauliflowers commences in August, when towards the end of the month the first sowings of *Early London* can be made. Great care must be taken that the plants do not grow too gross in the autumn. If they show any tendency to do this, the larger ones

must be drawn and pricked out. During October all the plants that are required for the crop must be put under protection. Many people prick the best plants into thumb pots and place them under lights; some prick the plants into the soil and cover them with lights. An old plan was to prick the plants into beds 4 ft. 6 in. wide, and cover them with an arch of trellis-work, over which mats were thrown at night and during severe weather. This practice seems to have gone quite out; perhaps the cheapening of the price of glass and of the production of frames for lights has had much to do with its abandonment. When cloches or bell glasses are used the Cauliflower is the first crop put under them.

In January, on well-manured and deep-trenched ground, the strongest plants selected from those in the pots are put out. The method is to plant four with a trowel in a square inside a circle described by the circumference of the base of the cloche (fig. 469). A space sufficient to stand the cloche when taken off the plants is left between the clumps of four, and the rows are planted 4 ft. apart. The cloches are kept on continuously during the early weeks of spring. Little giving of air is required, as plenty gets in, as a rule, round the edges of the cloches through unevennesses in the soil. If any is required it can be given by tilting the cloche with a piece of notched stick.





CAULIFLOWERS AND CABBAGES FOR COVENT GARDEN MARKET



SORTING CAULIFLOWERS INTO "FIRSTS" AND "SECONDS"

THOMAS W. J. VANCE





When the plants get big enough to fill up the cloche, in April, the glass is taken off, the four plants are pressed outwards, and a spadeful of earth put into the middle to keep them apart. As soon as they have got a little upright again they are moulded up around the outsides with the spade. Just before this process of moulding up, a little stimulant, such as sulphate of ammonia or nitrate of soda, may be sprinkled around the roots.

The plants under the cloches come into cutting during the beginning of June, and usually command good prices for the best, commencing at 4s. per dozen and getting down to 2s. Great care has to be taken to keep the "flowers" clean and white and close, discoloured or "buzzly" ones being of little value. Those plants that are not put out under the cloches remain in the frames till the middle of March, when they are transplanted to the open ground, 2 ft. 6 in. by 2 ft. apart.

As soon as they are half grown they are the better for being earthed up with the earthing plough. They will come into cutting about Midsummer Day, and will not be long about it when they start. The difficulty will be, especially in hot weather, to keep pace with the rapidity with which they will "turn in". In order to keep the heads from discolouring, the leaves are broken over them before they are completely out.

Many an early morning must be given to the Cauliflower cutting during the fortnight that they are turning in, if they are to be got to market in their perfection. The method of preparing for market is to "dock" the long leaves with a docking knife to within 2 in. of the head, to grade into three or four grades, and then dip in clean water and pack, using the cut-off leaves, after being washed, as packing.

The price varies according to the season. No one seems to know what are the causes that rule it. Some seasons they sell well nearly all through, and at others they are low in price and a dragging trade from almost the commencement. Some people say the cheapness or otherwise of the Pea crop affects the Cauliflower market.

Apparently there must be on the one hand a number of growers who chop about from crop to crop, at one season going in for Cauliflowers and glutting the market, then leaving them and giving some other crop the benefit of their attentions; on the other hand, there must be a section of the public who one season *must* have Cauliflowers and another will *not* have them. The price of "best" ranges from 2s. to 10d. per dozen. Seconds from 1s. to 6d. per dozen. For thirds, what you can get. Other varieties of the Cauliflower to continue the season after Early London is finished are the *Maltese* and the *Hardy Paris* (*Dur de Paris*) for summer, and *Veitch's Autumn Giant* for early autumn work.

A sowing of one of the first two can be made under lights in September, the other sowings to be made under glass in January and February. The seed bed for the Autumn Giant is made in March. The Maltese and Hardy Paris can only be grown successfully where there are means of irrigation. The heads will not come clean and white during July unless the land in which the plants are growing is kept regularly watered. [W. G. L.]



## § 12. CELERY

The cultivation of this vegetable (*Apium graveolens*) has undergone a veritable revolution during the last twenty years. Time was when large gangs of men might be seen in early morning or late evening in the market gardens near London carrying water pots from which out of large store tanks they watered the rows or beds of Celery. It was planted in rows 5 ft. apart, up the middles of which a crop of early Turnips or Cauli-flowers was taken. The plants had been raised on manure-heated pits, and had been carefully pricked out and constantly watered. The cultivations



Fig. 470.—Celery

were all done with the spade, and from the time that the first spit was drawn to the time it was “closed” in, the cost of landing was £14 per acre. Where the method of cultivation was in bed, the mould was thrown out to the depth of half a spit from beds 4 ft. 6 in. wide, leaving alleys of the same width. On the raised mould of the alleys a crop of Radishes or Lettuce was taken. The Celery was planted in the beds in rows 1 ft. apart, planted crosswise with plants 8 in. apart. The moulding was done with boards secured at each end in trough fashion, leaving an aperture at the bottom for

the soil to escape. The board was carefully placed between the rows, filled with well-pulverized soil, and then lifted out, leaving the soil behind. This operation was repeated until the requisite length was obtained, the outsides of the beds being of course carefully landed up each time.

The land for the rows or beds was prepared for the Celery by digging in a good coat of manure.

The crop thus grown was lifted in winter and taken into the packing shed, railways often being used for the purpose, where the heads of Celery were trimmed in root and leaf, washed, and bound into bundles of eight heads to a bundle, the binder grading it as he went, into “best” and “seconds”. The bundles were packed in “barges”—a basket now unknown on the market, and which cost 10s. 6d. each—each “barge” took twelve bundles, and the price of the best was frequently 21s. the twelve. Some growers took advantage of nearness to the Thames or other stream to devise means of flooding the alleys of the Celery, and thus saved the hand labour with the water pot.

A little “bed” Celery is still grown by some market gardeners near

London for early autumn work, but the culture as it was twenty years ago is now practically extinct. The cause is the development of the cultivation in the Fens of Lincoln, where the black sandy land and the abundance of water make ideal conditions with which artificial arrangements cannot compete. The moulding is done with the plough, and all the expensive spade labour has been done away with.

The Celery, thus grown, is sent all over the country in truck loads, done up in bundles of twelve and sold in its dirty state untrimmed and unwashed, and the price is 9d. to 1s. a bundle. The seedsman has evolved a type of Celery to suit the culture, which grows rank and strong, but the coarse-flavoured stringy leaf stems produced will not bear comparison with the stringless, nutty, mild-flavoured vegetable which was the Celery of the old-fashioned market gardener.

The "dirty" Celery, as it is called, has given rise to a new industry. Bundles off the railway trucks are taken to cellars near the London markets, and there the heads are trimmed, washed, and bound into bundles as used to be done by the market gardener, and then sold again on the markets. Perhaps the public taste may some day come back to the old type of Celery; then the culture must proceed on the lines indicated above, but it had better not be attempted except where plenty of water exists.

For those who make up their minds to grow it, the seed of Celery must be sown on heat in January or February, the seedling plants being pricked out in beds and finally planted in the beds or rows in May.

Plenty of manure must be provided. The first two mouldings can be managed with the plough, but the mould must be pushed in to the Celery before each operation with flat pushers or backs of wooden rakes, so as to keep the stems together and the leaves up.

A white Celery is often pushed on so as to be on the market in August and September. *Bibby's Defiance White* is good for this purpose. *Clayworth Prize Pink* and *Leicester Red* are two varieties also largely grown. [W. G. L.]

**Celeriac or Turnip-Rooted Celery** (*Apium graveolens rapacea*).—This differs from the ordinary Celery in having the stems swollen into a somewhat irregular turnip-like mass as shown (fig. 471),

The "roots" attain a weight of 3 or 4 lb., and are cut up into slices and used in salads, for flavouring soups, &c. They are grown in small quantities in some market gardens. The seed is sown in gentle heat in



Fig. 471.—Turnip-rooted or Knob Celery



March and April, the little plants being afterwards pricked out 3 or 4 in. apart in boxes of light rich soil, or in an old hotbed. By the end of May, or early in June, they will be ready to plant in the open air, 1 to 1½ ft. apart every way, in rich and deeply worked soil. The swelling of the stems is hastened in autumn by removing the lower leaves that are turning yellow; and from the end of September onwards they may be lifted and stored for use in dry, airy places; or they may be left in the ground if protected with litter, &c., till required.

**Pests.**—The Celery crop is liable to be attacked by maggot of the Celery Fly (*Acidia heraclei*, or, as it is better known, *Tephritis Onopordinis*). The insect (fig. 472) appears in April, and is of a tawny brown colour.

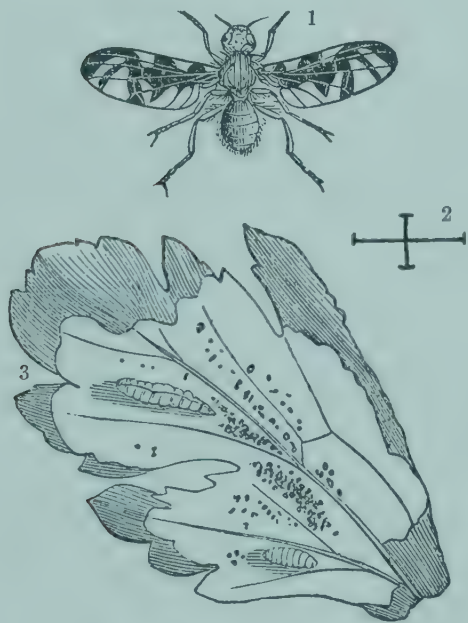


Fig. 472.—Celery Fly (*Tephritis Onopordinis*)

1, Fly (magnified). 2, Lines showing natural size. 3, Larva and pupa figured on blistered leaf.

The wings, which have an expanse of about ½ in., are transparent and iridescent, with oblique lines of brownish or rusty spots running through them. The larva varies from white to very pale green in colour, and has no legs. The eggs from which the larvæ arise are laid singly upon the upper surfaces of the leaves of the Celery and also of the Parsnip, which is closely related botanically. The eggs hatch out in six or seven days, and the young maggots at once bore through the skin of the leaves into the tissues, the substance of which they feed upon, thus forming “mines” between the upper and lower surface. In about fourteen days the maggot changes into a pupa either in the leaf or in the soil. A few days later a new and perfect insect is hatched out, and several broods may be born in the course of the year, the last one, how-

ever, remaining in the puparium stage in the soil, or in pieces of stalk or leaf, during the winter.

From the nature of the attack the maggots must either be prevented from tunnelling in the leaves of Celery and Parsnips, as, when once inside, they can only be destroyed by picking off the diseased portions and having them burned. On no account should stalks or leaves of Celery and Parsnip containing grubs of the Celery Fly be thrown on the manure heap, as the pest will mature there as readily as elsewhere.

One of the simplest and best remedies is to spray the foliage early in the season with a mixture of soft soap and paraffin. A quart of paraffin and ½ lb. of soft soap, well churned up in warm water at first, and then diluted with water to 10 gall., makes an excellent solution. Large quantities, of course, would be necessary for field work, and it would be best to spray with a knapsack or other distributor. Two or three applications during the year may be necessary as a preventive.

Another Celery pest is the Celery Stem Fly (*Piophilæ Apii*). The grubs of this tunnel down the blanched stalks and make rusty tracks. These not only disfigure the stems and render them more or less unsaleable, but very often also cause them to rot.

The best remedy for this pest is to till the ground deeply and keep it clean and free from weeds, and to give a good dressing of lime or soot as soon after planting as possible. [J. W.]

### § 13. CUCUMBERS

The Cucumber (*Cucumis sativus*) is an East Indian annual, having roughish, trailing, angular fleshy stems bearing large angular and heart-shaped coarsely toothed leaves, roughish to the touch like the stems, each one being borne alternately and opposite a succulent tendril. The yellow short-stalked flowers are borne in the axils of the leaves, but male and female flowers are quite separate and distinct from each other. The Cucumber is therefore monœcious, like its first cousins the Vegetable Marrow and the Melon. The female flowers are easily recognized by the swollen ovary at the base, which eventually develops into the well-known, oblong, cylindrical fruit. The development of this is not dependent upon fertilization, as in the Melon, and many growers therefore pick off all the male or staminate flowers, as they are only a hindrance to the formation of the fruit. If, however, it is desirable to obtain seeds, it is essential to retain the male flowers and transfer the pollen from them when ripe to the stigmas in the female blossoms, and thus secure fertilization. Indeed the production of good Cucumber seed is an industry in itself, and many growers devote almost their whole time to it.

The great aim, however, of Cucumber growers generally is to produce large supplies of fruit for the markets every year. Extensive ranges of glasshouses have been erected around the metropolis (at Enfield, Edmonston, Ponders End, Waltham Cross, &c.) and many large provincial towns expressly for Cucumber growing, and there are thousands of tons of fruit produced now where years ago there were only hundredweights. The span-roofed style of house is most favoured, and the length may be anything from 100 to 300 ft. long, while the width may be only 10 to 12 ft. An excellent and convenient size is about 200 ft. long by 13 ft. wide. Where, however, Cucumbers are grown as a "catch crop", as they often are during the summer months, any kind of glass structure with sufficient heating apparatus is utilized for the purpose.

Being practically a tropical plant, the Cucumber requires plenty of heat. Being also of a very fleshy succulent nature, and of quick growth, it must also have an abundance of moisture. But when the expressions "plenty of heat" and "abundance of moisture" are used in a horticultural sense they must not be literally understood to mean that there is to be no limit to either a high temperature on the one hand or to a supply of



water on the other. Some growers in the past have, however, taken such expressions literally, and have grown their Cucumber plants in structures that could only be compared to a Turkish bath. The plants were steamed to death, with the result that their constitution broke down under the terrific strain, and the deadly "spot" played havoc with the crop. Such growers, instead of using their horticultural common sense, fled to the chemist (who knew little or nothing about the business) and wanted some concoction that would check, if not altogether kill, the disease. And the chemist, like a sensible man of business, immediately proceeded to compound his nostrums and to talk learnedly about the fungoid and other diseases of Cucumbers, at the same time not forgetting to take the fees to recompense him for his learning and skill.

Happily we have passed the stage where nurserymen used to "steam their Cucumbers up", and even houses were built without any means of ventilation so as to ensure the perfect "steaming up". Under such conditions, which were only too prevalent, it was not surprising that the goose that laid the golden eggs of the market nurseryman was nearly killed.

**Temperature.**—At no period in its growth does the Cucumber require a higher temperature than 90° F. to produce its maximum amount of growth and fruit; and it may be taken that a temperature from 70° to 90° is the best all-round temperature for Cucumbers. Of course, with sun heat, the temperature of a Cucumber house will often go above 90° F., but then the ventilation can be so regulated that a pure and buoyant atmosphere saturated with moisture will be maintained.

**Soil.**—Cucumbers naturally like a good turfy loam. The top spit from a meadow or piece of pasture land, if stacked up about six months before use, and enriched with alternate layers of stable manure, or indeed any organic manure such as that obtained from the poultry run, rabbits, &c., will give excellent results. At the time of use the addition of a little lime or basic slag will also prove beneficial. The compost should be chopped down with the spade, but should not be sifted, the spade being used to reduce the turves to a sufficiently small size. When good turfy loam is not available, any ordinary good garden soil enriched with well-rotted manure and leaf mould will give satisfaction.

**Sowing the Seeds.**—The first consideration is to obtain good seeds from a reliable source, as one of the first steps towards success is to have strong and sturdy plants. When two or more crops are to be grown during the year, the first sowing should be made about the first week in December. Some growers sow from twenty-four to thirty seeds in shallow boxes, using a fairly rich and gritty soil. A better practice, however, is to sow the seeds singly in 2½-in. pots, making a hole with the finger or a dibbler about 1 to 1½ in. deep in the centre of the compost, afterwards covering and watering in with tepid water. Place in a temperature of 70° to 85° F., the first-named being probably better for the seeds sown in December, as too high a temperature is apt to weaken the plants during the short days.

In due course the seed leaves appear through the soil, and later on are followed with the true roughish, lobed leaves, and later on still the tendrils. Once germination has taken place, plenty of light should be given, but the temperature must be maintained up to 70° or thereabouts at night. The young plants are sprinkled over or syringed with tepid water two or three times a day according to the state of the weather, and the atmosphere is kept moist and buoyant, not only to ensure rapid growth, but also to check attacks of Thrips and Red Spider—pests that soon appear if the air is allowed to become too dry.

When the seedling pots are filled with roots the plants should be shifted into 5-in. pots, or if space is available they may be planted at once in a fairly rich and gritty compost. Later crops are often transferred from 3-in. to 5-in. pots while waiting for space, and also because a good trade is done in selling the young plants to growers who have not the convenience for raising a supply of plants themselves.

Another method of raising Cucumber plants is to fill a 3-in. (60) pot about half-full of compost, insert a seed in each pot, and cover slightly with soil. When the first true leaves, after the seed leaves, appear, a little more compost is added in the way of a topdressing, almost up to the rim. At this stage the young plants, being very tender and juicy, must be handled with great care, but the topdressing will generally carry them till planting time.

**Planting.**—When Cucumbers are grown in specially constructed houses it will pay to keep the latter in a clean condition. This may be accomplished by whitewashing the brickwork with limewash, and by burning some sulphur or brimstone with all the ventilators and doors closed as tightly as possible. This is to suffocate and kill any insect pests and fungoid diseases lurking in the crevices, &c. Two or three pounds of sulphur will be sufficient to vaporize a house 100 ft. long.

The soil to be used should be chopped down with the spade from the heap of compost, but not into too fine a condition. A little superphosphate of lime, basic slag, or dissolved bones may be sprinkled over it at the rate of a 5-in. potful to every barrowload, and thoroughly mixed by turning over.

The compost thus prepared is then placed in little heaps 2 to 2½ ft. apart in the houses, about 1 bus. of soil being sufficient for three plants at first.

When the plants are large enough they should be planted in their fruiting quarters without delay. Owing to their rapid growth they soon begin to look yellowish and sickly if kept too long in the small pots. In planting, a hole should be scooped out in the centre of each mound of soil, and deep enough to allow the top of the ball of soil attached to the plant to be about 1 in. or so below the fresh soil. This should be pressed carefully but firmly round the roots and base of the stem, to encourage new roots and increasing vigour. In two or three weeks each mound of soil will be permeated with a mass of clean healthy-looking roots.



**Topdressing.**—When the new roots are seen coming through the surface of the soil it becomes necessary to add fresh compost to the mounds. An inch or so all over of a fairly rich gritty soil will be sufficient. Right through the period of growth this topdressing operation must be performed at fairly regular intervals. Some growers use in addition to the compost special stimulants in the shape of concentrated proprietary manures in small doses. Nitrate of soda is also used as a liquid manure at the rate of 1 oz. to 1 gall. of water, but only when the foliage shows any signs of turning yellow. Topdressing with fresh stable manure should be avoided, as the ammoniacal fumes may scorch the leaves and spoil the plants. Soot is used to give a deeper green to the leaves and fruits, but it should be used sparingly, as large quantities are likely to impart a bitter flavour to the Cucumbers.

**Stopping.**—When Cucumbers are planted from 2 to 3 ft. apart, the main stem is often allowed to reach the top before it is “stopped” by having the tip pinched out. Some, however, pinch it once or twice before it reaches the top, and all young fruits and flowers on the main stem are suppressed as they appear. This induces the quicker development of the “laterals” or side shoots. These are stopped, as a rule, at the second joint when a fruit has formed at the first joint. The sub-laterals, or shoots arising from the laterals, are stopped in the same way at the second joint if a fruit has formed. After this it is a matter of judgment as to whether further shoots shall be allowed to develop or to be suppressed, according to the state and strength of the plants and the time available to finish the crop. But as a rule market growers rarely allow fresh growth beyond the sub-laterals.

**Tying.**—To be able to tie the shoots of Cucumbers quickly and well to the trellises requires some little practice and experience. It is necessary to have a tie at almost every joint, and the operator must take great care not to rub off or knock off the flowers from the tips of the small fruits, as this seems to have the effect of stunting their growth.

**Syringing.**—In Cucumber growing the syringe is frequently used, but especially in the morning, and in the afternoon when the ventilators are closed or nearly closed. A moist atmosphere, combined with genial warmth, are essential to healthy growth and rapid swelling of the fruits. The moisture is also the great check or antidote to attacks of Red Spider. If the atmosphere cannot be kept sufficiently humid with the syringe and the usual watering, it will be necessary to damp down the pathways and walls frequently, and dry currents of air must not be allowed to rush through the doors or ventilators. While too dry an atmosphere is bad, care must be taken, in rendering it humid, not to make the compost round the roots so sodden with water that the fresh air is driven out of it, and the decaying organic material in it becomes sour, and engenders the development of Eelworm at the roots and “spot” in the leaf.

**Shading.**—Although the Cucumber comes from hot and sunny climes, nevertheless it must be shaded slightly from even our British summer





### A CUCUMBER HOUSE

In Messrs. T. Ruchford & Sons' Nursery, Broxbourne, Herts





sun. If the "vines" or stems are trained to wires 1 ft. or 9 in. from the glass, there will be a good cushion of air between the leaves and the glass, and shading need not be put on so early in the season. As soon, however, as there is the slightest danger from burning, the brilliancy of the sun's rays should be softened by spraying some whitening over the glass, on the south side more particularly. If an eggcupful of oil be added to a bucketful of whitening it will make it stick better in case of rain. Starch and flour, well mixed and dissolved in hot water, also make a good shading mixture for glasshouses in summer.

**Cutting and Grading.**—Cucumbers must be cut down when they are exactly the right size for market, and the grower must exercise his judgment as to what that right size is at different times during the season. The first fruits may be cut about eight, ten, or twelve weeks after sowing in December, and in about six or eight weeks after sowing in April or May. If the fruits are allowed to hang too long on the plants they are not only a heavy strain on the nourishing sap, which would be better utilized for the development of fresh fruits, but they are also likely to lose somewhat in flavour. When the Cucumber season, therefore, is in full swing, and the plants are fruiting freely, it would be wise to cut every day all the saleable fruits. Beginners are apt to be deceived as to the size of Cucumbers, and may fall into the error of cutting them too small or too thin. To avoid this, a good plan is to feel the fruits before cutting if in doubt. A good saleable Cucumber should fill the hand well, whereas if a fruit is not up to this standard it should be left till next day or the day after. All deformed crooked fruits ("crooks" as they are called) should be cut off as soon as possible and sold for what they will fetch. As cutting proceeds, the fruits should be placed in wooden trays or baskets, previously lined with a little hay or clean litter to avoid bruising. The fruits are then taken to the packing shed, where they are sorted or "graded" into sizes, in accordance with the number of fruits likely to go into a "flat"—that is, a shallow basket or box that will hold a certain number of a certain size. It is thus possible for these flats to hold  $1\frac{1}{2}$  dozen, 2 dozen,  $2\frac{1}{2}$  dozen, 3 dozen, 4 dozen, or 5 dozen fruits, according to the size of the latter. After this the fruits are generally so small that they are sold as "gherkins", for pickling, &c., and at so much per flat.

**Packing.**—Before actually placing the fruits in the flats or trays a layer of hay, wood wool, or any soft and clean packing material is placed in the bottom, and more packing material is placed between the layers of cucumbers to prevent bruising. The fruits must be packed firmly but carefully to prevent shifting about in transit. Each grade is clearly marked in some way indicating the quantity and quality, either by a special label attached to the handle when the flats are to be sent away, or by different-coloured paper coverings if the grower is taking the cucumbers to market himself for direct sale to his customers. Market prices vary a good deal. Some of the best fruits early in the year may



realize from 10s. to 12s. per dozen; but from May to October, when thousands of fruits are sent to the markets every day, the price ranges from 1s. to 3s. per dozen fruits, and the grower now considers himself lucky if he can average 1s. 6d. or 2s. per dozen for his entire crop.

**Varieties.**—There are many varieties known, but only a few are grown for market work, the favourites being *Telegraph* and *Rochford's Market*.

**Profits.**—The profits obtainable from Cucumber growing cannot be estimated with great accuracy in these days, but at one time they were undoubtedly great. Now there is not only enormous competition amongst the growers themselves, but the working expenses in fuel and labour are higher than at any previous period, while the market prices have sunk to a very low point indeed, good fruit sometimes only realizing 9d. per dozen. But that is the case with almost every marketable commodity—very low prices are almost as exceptional as very high ones; and it is the average that counts after all.

Taking a house 200 ft. long and 13 ft. wide, it would be possible to grow 100 Cucumber plants on each side, making 200 altogether. With ordinary care and cultural skill each plant should average a crop of about 4 dozen good fruits, making for the whole house 800 dozen. At an average price of 1s. 6d. per dozen, this means a gross return of £60 from about  $\frac{1}{16}$  ac. in about four months, and about one-third or £20 should represent the net profit after paying for labour, fuel, water, &c. So that Cucumber growing, although it has its drawbacks, is nevertheless an important and not altogether unremunerative industry.

**Ridge Cucumbers.**—Certain kinds of Cucumbers may be grown well in the open air during the summer months, and if grown extensively, as they are in some places, may realize profits ranging from £20 to £80 per acre. The seeds are sown in April, and the young plants are in due course put under handlights or bell glasses on ridges made over hot dung. Before the ridges are made, trenches about 3 ft. wide and 1 ft. deep are taken out on a piece of land having a gentle slope to the south if possible. The trenches are then filled with hot manure to a depth of 1 to 2 ft. The manure is covered with about 9 in. of the soil dug out of the trench, and when this is nicely warmed through the young Cucumbers are planted under the glasses. These are retained for protection against cold until the weather becomes genial; and it may be necessary to cover with mats at night if the temperature falls too much. Indeed the system is almost identical with that adopted in French intensive gardens (see p. 203). Copious supplies of water must be given during the growing period, and the leading shoots must be stopped when about  $2\frac{1}{2}$  to 3 ft. long. The side shoots are also stopped a couple of joints beyond the fruits, and the latter are cut as soon as they are judged to be fit for use. Amongst the best kinds of Ridge Cucumbers are *Best of All*, 12 to 15 in.; *King of the Ridge*, 12 to 16 in.; and *Stockwood*, 9 to 12 in. To these may be added the *Gherkin* or *Short Prickly*, grown chiefly for pickling. [J. W.]

Ridge Cucumbers were largely grown in the Evesham district until recent years, since when they appear to have decreased in favour as a remunerative crop. A variety named "Stockwood" was the favourite, and a grower has informed the writer that he has known them to realize £90 per acre; but he estimated their average value until recently at about £45 per acre.

Generally the Cucumber plants are raised from seed sown where the plants are to be grown and fruited—viz. on small mounds under which has been placed one or two forkfuls of warm stable manure, the soil being raised thereby. The top of each mound is flattened or slightly hollowed, three or four seeds are planted in the middle and about  $1\frac{1}{2}$  in. in depth; a metal ring 10 or 12 in. in diameter and 4 or 5 in. in depth is placed over them, and a piece of glass which is a little larger than the ring placed over all. Until the seed has germinated the glass is kept covered on cold and sunless days; but advantage is taken of a warm sun to raise the temperature under the glass. When the plants appear above the soil the weaklings are destroyed and the strong plants left to grow. Every night the glass over each is covered with old bag, canvas, carpet, or anything of the kind available, to prevent an undue lowering of temperature and possible injury. By the time the plants outgrow the protection of ring and glass, June is some days old, and the glass may be dispensed with. These mounds are made about 5 ft. apart on warm borders, or between triple and quadruple rows of early Broad Beans, which shelter and keep them warm.

Those who have a warm frame or greenhouse usually raise a few hundreds or thousands of plants by sowing two or three seeds in pots 3 in. in diameter in light soil, and plunge the pots close together; the strongest plants only are allowed to remain, as in the case of the seedlings raised out-of-doors. By these means a few days are gained in cutting the first fruits, and the surplus plants are sold at remunerative prices.

The rows of mounds are about 6 ft. apart and about 5 ft. apart in the rows. It will be readily understood that three or four rows of broad beans 1 ft. or more high at the end of May and early in June, with a space between of 3 or 4 ft. for these Cucumbers, form a very cosy and early plantation when carried out to the extent of fifty or sixty rows of Cucumbers and as many blocks or beds of early Beans. And it is not difficult to realize what a substantial sum will be returned from a  $\frac{1}{4}$ - or  $\frac{1}{2}$ -ac. plot of early Broad Beans and early Cucumbers, especially when there is added the returns from early Radishes, which *preceded the Cucumbers* the same season, the seed of which had been sown in December or January. [J. U.]

**Insect Pests of Cucumbers.**—The worst insect pests of the Cucumber are Thrips, Greenfly (aphides), Red Spider, slugs, woodlice, and Eelworm. Greenfly are easily kept in check by syringing the young plants occasionally with any of the soft soap, quassia, and nicotine washes on the market. Thrips and Red Spider will both soon appear



if the atmosphere and soil are allowed to become too dry. Consequently the best natural remedies or preventives are the judicious application of water to the soil, pathways, and foliage, taking care that it is of the same temperature as that of the house itself. If these pests should get the upper hand, it will be necessary to fumigate or vaporize the houses to get rid of them.

Slugs and woodlice are sometimes troublesome, and will spoil the fruits if not suppressed. When cutting the fruits an eye may be kept on the slugs, everyone seen being dispatched on the spot. Traps of pieces of

potato, beetroot, carrot, or mangel-wurzel may also be used for the slugs and woodlice, examining the pieces at intervals and destroying the pests in them.

*Eelworms*.—These minute eel-like pests often play great havoc with Cucumbers and Tomatoes in market nurseries. They are the outcome of a pest known as *Heterodera radicicola*, and are hatched in the soil from minute eggs. About seventy-five of the young worms go to an inch when placed end to end, so that it requires a good lens to discover them.

The cause of the appearance of Eelworm seems to be due almost entirely to the superabundance of rich organic manure in the soil, and to overdoses of water and too high a temperature. Wherever soil has been highly enriched with large quantities of stable manure, and perhaps chemicals in addition, the Eelworms appear, being themselves no doubt the natural development from eggs laid in decaying organic material. Their presence undoubtedly indicates a sour or acid condition of the soil, which is fatal to the plants. The fibrous roots are invaded by the Eelworms, and in a short time become irregular warty neck-

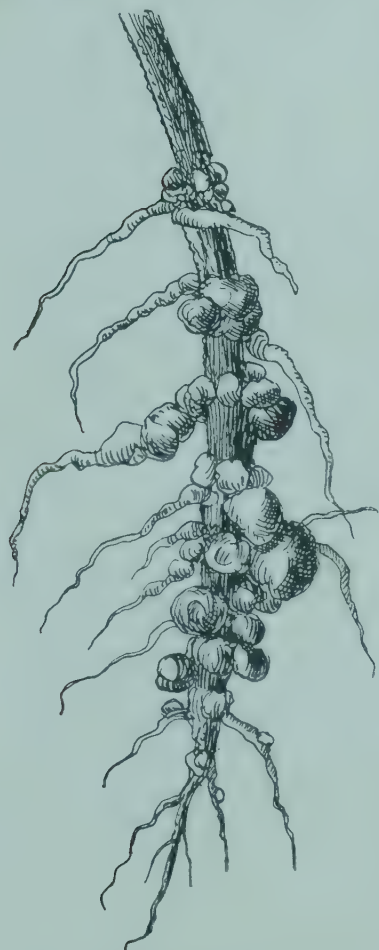


Fig. 473.—Cucumber Roots infested with Eelworms

laces, partly exposed on the surface of the soil, as shown in the sketch (fig. 473).

Many remedies have been tried to extirpate the Eelworm disease, and although some at first have apparently checked its advance, it is only for a short time. Carbolic solutions and sulphate of copper applications have proved useless, and every other suggested remedy, including naphthalene and solution of permanganate of potash, so long as erroneous cultural methods prevail. These consist in having a soil *too* rich in humus, and then rendering it sour and devoid of oxygen by the application of too much water, in addition to which may be mentioned too high a temperature (over 90° F.), and a stuffy atmosphere due to bad ventilation. By altering these things, and using a little basic slag or slaked

lime to neutralize the acidity of the soil, there will not be much trouble from Eelworms. Once a soil is so badly infested with Eelworms, the only remedy seems to be to clear it out of the house, mix plenty of lime with it, and store it up in a heap for some months until it becomes once more sweetened or oxygenated (in other words "sterilized") by exposure to the weather. If used too soon for other crops, such as Carnations, bulbous plants, &c., the pest is likely to attack these, especially if grown under glass.

**Fungoid Diseases.**—Amongst these are Mildew, Leaf Spot, and Sleepy Disease. The Mildew appears in the form of a whitish efflorescence on the leaves, but does not cause much injury. It may be checked by syringing with water in which a little camphor has been dissolved for a few hours. An ounce or two of camphor should be placed in a muslin bag and sunk in the water tank for the purpose.

The Cucumber and Melon Leaf Spot is caused by a fungus called *Cercospora Melonis*. It attacks the leaves first of all in the form of small brownish spots, which rapidly develop into confluent patches, and ultimately destroy the green assimilating tissue of the entire leaf. This disease has been brought about by the "express" or steaming method of growing Cucumbers under conditions quite unnatural. Too much heat, too much water, too much manure, and too little fresh air—those are the causes of Leaf Spot, and, until they are removed, any amount of fungicides will have no effect. Solutions of sulphide of potassium or liver of sulphur (1 oz. to 3 gall. of water), carbolic, cyllin, lysol, and other disinfectants have been applied in the vain hope that they will prevent the disease, but they are quite unavailing under the bad conditions mentioned.

Sleepy Disease causes the leaves to flag or wilt suddenly without apparent cause. It is best to take affected plants up and burn them. [J. W.]

## § 14. ENDIVE

This salad vegetable (*Cichorium Endivia*) may be mentioned along

with the Lettuce. The demand for it is certainly not very extensive yet, but as the eating of salads seems to be becoming more general among our population, it may be hoped that the qualities of Endive may receive more appreciation.

Endive is essentially a late-summer vegetable. Sowings begin in late



Fig. 474.—Endive



May and can be continued at intervals of a fortnight up to early August; the later sowings always run the risk of being touched by early frosts. Endive is best sown in drills 15 in. apart and singled out to 1-ft. spaces. A good green curled variety is *Ruffec*, and a little of the broad-leaved *Batavian Hearting* (fig. 475) may be grown. Endive must be tied up



Fig. 475.—Endive—Broad-leaved Batavian

tightly and left for the heart to be quite bleached before being pulled.

The flying spores of a fungus are apt to attack the tender heart leaves of the Endive, especially during moist weather, causing them to go brown round the edges. These edges go rotten when the plant is tied up, and spoil its selling value.

A spraying once a fortnight with a solution of liver of sulphur (1 oz. to 3 to 4 gall. of water) is recommended as a preventive, though its value is at present more theoretical than practical. [W. G. L.]

## § 15. INDIAN CORN OR MAIZE

The Maize plant (*Zea Mays*) is an American annual with many varieties. In the United States something like 3,000,000,000 bus. of "corn" are grown annually on about 70,000,000 ac. of land lying mostly in the Mississippi valley, thus giving roughly an average of about 43 bus. to the acre. Of late years the Maize plant has attracted the attention of both farmers and market gardeners, the former looking upon it as a valuable green fodder crop for their cattle, the latter as a vegetable worthy of some attention. The heads or "cobs", if gathered before the "seeds" become hard, and boiled for half an hour or so, make a palatable vegetable eaten with salt and butter, and are considered quite equal to the best Peas in flavour. For edible purposes some varieties are better than others, some of the best for cultivation in the British Islands being the *Early Sweet Cory*, *Early Sweet Minnesota*, *Early Kendall's Giant*, *Extra Early Premo*, *Golden Bantam*, *Peep o' Day*, *Extra Early Tom Thumb*, and others. For cattle, the variety called *Southern Horse Tooth* is recommended.

To make sure of a good crop of Indian Corn "cobs" in the more favoured parts of the British Isles it is better to sow the seeds singly in small pots or in shallow boxes in April, in a warm greenhouse or on a hotbed, in a temperature of 60° to 65° F. The seedlings should have plenty of light, and, if hardened off by the end of May, will be fit to transplant to the open ground, about 2 ft. apart every way. The soil in which they are placed should be deeply tilled and well manured in advance, and the hoe should be used frequently, especially in hot dry seasons.

Farmers sow Indian Corn like wheat in drills about 6 in. apart, and use from 2 to 3 bushels of seed to the acre.

The Maize plant (fig. 476) is monœcious, like the Cucumber, Marrow, Melon, and Begonia, that is to say, its male (staminate) and female (pistillate) flowers are quite distinct from each other, although borne on the same plant. The male flowers are borne in a panicle at the top of the stems as shown in the illustration, while the female ones issue in the form of hardened spikes or "cobs" from the axils of the gracefully arching leaves lower down the knotted stems, each cob being furnished with a feathery plume or tassel. A female spike or cob will have from 500 to 1000 ovaries, each of which may develop into a grain of "corn" in due course. In Britain the plants attain a height of 3 to 5 ft. or more, being much shorter than in the United States.



Fig. 476.—Indian Corn (*Zea Mays*)

## § 16. KOHL-RABI

This distinct-looking vegetable (*Brassica oleracea Caulo-rapa*) is about halfway between a Cabbage and a Turnip. The stem is swollen into a roundish turnip-like mass or "bulb" which varies from 3 to 8 in. in diameter, the smaller size being more valued for human use, the larger ones for cattle. As a market-garden crop it is not yet extensively grown. There are two principal varieties — the white-bulbed or Green Kohl-rabi, and the Purple Kohl-rabi. According



Fig. 477.—Kohl-rabi

to the Returns of the Board of Agriculture and Fisheries, there were 13,330 ac. of Kohl-rabi grown in 1911. Suffolk apparently is the largest Kohl-rabi-growing county in the kingdom, with nearly 1300 ac.



Kohl-rabi flourishes in rather a heavy soil that has been deeply dug and well manured. The seeds may be sown in drills about 18 in. apart, the young plants being afterwards thinned out to at least 12 in. apart in the rows, giving about 30,000 plants to the acre. The seeds may also be sown in beds from which the seedlings are transplanted 18 in. apart every way, a little less than 20,000 plants to the acre. From 20 to 40 tons of "bulbs" may be obtained to the acre. The bulbs are best for household purposes when young and tender, and 3 to 4 in. in diameter.

Being a Crucifer Kohl-rabi is subject to attack from the "clubroot" fungus (*Plasmodiophora brassicæ*), and should therefore not be grown in soil known to be afflicted with this disease until it has been well dressed with basic slag, lime, or chalk. [J. W.]

## § 17. LEEKS

This widely used vegetable (*Allium Porrum*) is increasing in importance since the practice has spread of using it as a boiled vegetable and not only as a flavouring. It requires rich land to come a good size.



Fig. 478.—Leek

The giant specimens with bleached stems 1 ft. in length that one sees at vegetable shows, like so many other show items, are not commercially possible. The leek of the market is sown first of all for early work in February under glass, and for the main crop in March out-of-doors. Plantings begin in April, and can be continued up to the end of June. In order to get as much bleach as possible drills are made, either by weighting the racer or with a hoe, 1 ft. apart, and the Leek plants dibbled in these 6 in. from plant to plant, and the plants put down in the holes up to where the leaves branch.

Leeks are trimmed of outside leaves and made into fan-shaped bunches, six or eight to a bunch, according to size, and washed be-

fore sending to market. Two good varieties are *Musselburgh* and the *Lyon*.

The price is 1s. to 2s. per dozen, and the crop  $2\frac{1}{2}$  to 3 dozen bunches per pole. The cost of digging, trimming, and washing is  $3\frac{1}{2}d.$  to  $4d.$  per dozen bunches. The planting of a crop of Leeks will cost 35s. to 40s. per acre and the hoeing about £3 per acre.

Leeks draw the land very much, so that after them the next crop usually requires generous preparation for it. The Leek is useful to plant on land which has clubbed with Cabbage crops—first, because it is immune to the disease; and secondly, because it frequently cures the land of the tendency for the next crop. [W. G. L.]

Leeks at Evesham are a more valuable crop after a “hard” winter than after a mild winter. The seed is sown in February, and the young Leeks planted in breadths on the level ground in May and June, the soil being rich. They are planted in rows 12 or 14 in. apart, and about 9 to 12 in. apart in the rows. The method of planting is to make a deep hole with a dibber and just drop the plant therein root downwards, that is all—no pressing of soil over the roots and around the stem. Leeks, French Beans, and Broad Beans are mainly “catch crops” in South Worcestershire. [J. U.]

## § 18. LETTUCES

This vegetable (*Lactuca sativa*) has been of late much in the public mind by reason of the booming of what is called “French Gardening”.

The culture of the Lettuce has been practised in France for centuries, where, it is said, on account of the poorness of the meat, the taste for salads was developed among the people generally long before it had got beyond the most select coterie here. The art was brought over to England by French gardeners who established themselves in Bermondsey when that district was famous for its gardens, and at the present day the old French family names will be found among our foremost market gardeners. What is styled “French Gardening” is a system, practised chiefly in the neighbourhood of Paris, in which Lettuces are cultivated on manure heat under glass lights and cloches, in conjunction with other crops, which are cleverly worked in so that a constant succession is maintained through the greater part of the year. Frequently two or three crops may be seen coming along together. The system “pays” the French *marâtcher*, who usually employs no labour except that of his wife and family, who knows neither half-holidays nor Bank holidays, who works on Sundays as long as on weekdays, who frequently takes his rest as he goes in his market cart to *Les Halles* (the markets), and who after all this is content to live with the strictest frugality.

Whether it “pays” in the generous English sense, which includes hired labour for the roughest of the work, and living in the degree of comfort our wiser economic conditions have happily made us familiar with, is another question.

The growing of early Lettuces under glass and the art of intensive cropping have been practised for generations by English market gardeners, only they have adapted their methods under the tuition of experience to our climate and our habits of business.

Lettuce plants for forcing on heat in the early spring are sown early



in October in frames. When the seedlings are up they are all the better for being thinned, so as to give the others room and prevent "drawing". Those that are pulled out can be pricked into frames or covered with cloches. The time for planting out depends upon the form of heat used. Over hot water they can be planted in the beginning of January, and then a couple of crops can be got in before the main crop of Marrows or Cucumbers, or whatever is intended, is put into the frames. If the heat is obtained from manure it is well not to plant till February, because the manure will lose its heat quickly, if put down earlier, before the sunshiny days come. On manure heat the frames will need covering at night, but this is not necessary when hot water is used. Some people sow French Breakfast Radishes before planting the Lettuce. It is doubtful whether anything is gained by this. The Radishes are apt to crowd and hinder the Lettuces. Carrots also are sometimes sown before sowing the Radishes. This plan answers better on the manure heat than on the hot water, as the Carrots will hinder getting a more profitable crop in. The "Early Paris Forcing" Lettuce is the best sort for earliest sowing. Sutton's "Golden Ball" is a good sort for second season.

For Cos Lettuces, dark or light-green Paris will do. The Cos are more difficult to manage, because they are so apt to get leggy. Good Cabbage Lettuces will generally make 2s. per dozen, and the inferior grades 1s. to 9d. per dozen. The Cos, if well done, will sometimes make 2s. to 3s. per dozen at the very beginning, although the larger proportion will be sold at 1s. to 9d. per dozen.

**Spring Lettuce.**—For early spring Lettuces in the open ground the earliest are the hardy varieties. For Cos *Hick's Hardy White*, and for Cabbage *Stanstead Park* or *Lee's Immense* are best. These are sown in late August thinly in drills, and afterwards planted 12 in. by 9 in. in open ground in October. Only light warm soil is suited to them. It is useless to attempt to grow them on soil that is the least heavy and cold.

A little shelter from winter's winds is a great advantage to these crops, and where the land is suitable the planting of shelter hedges would pay. Some people balk or ridge the land up, then level the furrows into gentle slopes to the south and plant two rows on each furrow. It makes the most of the sunshine and shelters from the northerly winds; but in a spring with many frosts and early thaws it is a question whether catching the early sunshine does not do almost as much harm as good.

The next Lettuces to come in are the spring varieties that have been housed in frames all the winter. Sowings for these are commenced in the second week in October, and continued regularly at intervals of a fortnight till the first week in December, after which it is well to desist until the New Year. The soil in the boxes must be made fine, levelled, and firmed before the seed is sown. A  $\frac{1}{2}$  lb. of sulphate of iron to the square yard of ground may be sown before the soil is finally levelled. It

helps the plants to resist the fungus attacks that frequently do great damage in the late winter.

The seed must be distributed evenly, and covered to the depth of  $\frac{1}{2}$  in. with sifted soot in which some sand and old mortar rubble are good ingredients. After sifting, the soil should be lightly patted. As soon as the seedlings show above ground the lights must be pulled off in fine weather and pushed on when it rains. This operation of pulling off and putting on needs doing several times a day in catchy weather. The lights must be put on at night and blocked up for air except in severe weather.

If the young seedlings show a disposition to "draw", which they will do if the glass is not regularly taken off in fine weather, or if there should be a run of gloom and wet, a good plan is to sift some fine soil evenly over them to "stank" them up. The constant attention to the Lettuce in the lights must be kept up till March. If the weather gets *very* severe they will need covering with mats at night, but they do not want coddling. When, after all this, the finished article sells in June for 2*d.* per score, as it frequently does, the market gardener has an opportunity of graduating in the school of which the patriarch Job is said to have been the most distinguished professor.

Planting begins at the end of February or beginning of March, according to the season. Sometimes a fungoid disease called the "drop" attacks the young plants in the lights. It shows itself by a browning of the leg just above ground. The disease spreads rapidly, and a day or two after its appearance patches of the plants will be found flagging. If they are examined, the brown ring will be found to have developed into a patch of dead tissue, cutting off all supplies from the roots to the top. Sprinkling with flowers of sulphur checks the spread a little, but the remedy most favoured is to hurry the plants out into the open fields. The sorts grown are "Fulham White Cos" for the earliest (although this sort appears to be less grown every year); "Paris Cos"—mostly a dark-green variety, at the early sowings, and a white variety after. For Cabbage varieties, "Vauxhall Defiance" and "Chavigny" are good sorts for autumn and winter sowings under lights. For summer work, "White Marvel of Cazard" and "Trocadero" may be tried, the latter for July sowings. The "Malta" and "Webb's Wonderful", two large-growing varieties, are much favoured in the Midlands, but will not sell at all in London.

Cabbage Lettuce during the summer are generally sown in drills 1 ft. apart, and then singled to 12-in. spaces.

The distances for planting are 12 in. by 9 in. for the Fulham Cos, and 15 in. by 1 ft. for the Paris Cos and the Cabbage Lettuces.

**Tying.**—If good strains of Cos Lettuce are bought, it will be found that they will heart without the aid of tying, and some growers send them to market untied; but it will be found to pay to put a bit of "fillis" round them, as it preserves their shape and spares the breaking away of the outside leaves. It will not be denied that careful attention



to the condition in which stuff is sent to market will always pay the individual grower, besides helping the trade generally. [W. G. L.]

Although the estimated area devoted to this crop in Evesham is only 100 to 120 ac., yet the total number of lettuces from that area is a very large one, being planted at the rate of about 174,000 per acre, or 6 in. apart in each direction—the actual number per acre at 6 in. apart being 174,240. One variety is chiefly grown, and that is “Schofield”. It is sown early in August, and in September strong plants are ready for planting out, which is done immediately the plums are cleared away. The Lettuce are planted under Plum trees in plantations and belts, on warm borders and in breadths between single or double lines of Plum trees, the earliest usually being gathered from under the trees and from warm borders. Birds are kept down, else serious destruction to Lettuce during winter would take place; and slugs and soot do not harmoniously exist together. [J. U.]

### § 19. MINT

Mint (*Mentha viridis*), like Parsley, is a crop of which sales of great bulk cannot be made, and which does not suit the grower whose instincts run to large breadths of a few crops. It is nevertheless a useful crop to the man who is willing to take pains over the small things. Mint has the additional advantage that where a man has glass it forces well and provides a useful item in his house rotation.

Mint requires generous treatment and does best on light soil. Plants are obtained from lifting an old bed, and then pulling the young growths so that each has a little bit of root. These are planted with the dibber 1 ft. by 9 in. as early in the spring as the plants are big enough and the land available. The crop must be kept free of weeds and should produce a good cutting in July. Hoeing is difficult to carry out late, because the plants throw out runners, which, if undisturbed, will cover the ground and provide the young growths for the next year.

**Forcing.**—Where mint is grown for forcing it will not be cut but be allowed to die back naturally. The roots for forcing are forked out or turfed in November and laid in the houses, covered with a little light soil, and beaten down tight. Heat and plenty of water are required, and the crop can be gathered from the middle of January to March, when it may realize as much as 5s. per dozen bunches of about forty sprays each.

It is the practice with some to leave a piece of Mint down for several years, keeping it in heart by liberal topdressings of manure every winter. Unless great care is taken in dealing with weed growths the land will get very foul.

Some plough it up after the midsummer cutting of the second year, and put a crop of strong-growing winter greenstuff on the land; to keep up the supply a fresh piece is planted every spring. The price of Mint is 1s. to 1s. 6d. per dozen bunches, each containing 3 to 4 dozen shoots, and a good piece will yield two or three cuttings during the summer. [W. G. L.]

## § 20. MUSHROOMS

Mushroom growing is reputed to be rather a gamble, owing to the doubtful results, and it is certain that success is not obtained unless the grower devotes a great deal of time and attention to every detail. It is only by taking every care and precaution that regular and paying crops can be secured.

If the grower succeeds in obtaining a good crop it is one of the most profitable that can be grown, but if only a poor crop is obtained, the returns are swamped by the outlay. Those situated near large cities have the best chance of success in the growing of mushrooms, as not only is the manure cheaper, but it is also fresher, and retains a far greater percentage of ammonia. Contracts are made to clear a number of stables regularly all the year round, and in this way the cautious grower makes sure that the manure is free from disinfectants. If he is unable to do this it must be bought by the yard—1s. 3d. to 1s. 9d. per yard, delivered, being the usual price. For those growers who are not near enough to a city for either of the above methods, manure must be obtained from a contractor, who will put it on rail at so much per ton—2s. a ton is a fair price, with carriage in addition. But in whatever way the manure is obtained, the important points are to get it free from disinfectants and peat litter; with either in, manure is not worth the getting. The best plan is to have it put on hard ground under a roof of galvanized iron. At any rate, provision should be made to shoot off rain.

**Preparation.**—The first step is to turn over the heap and damp it out. It is possible sometimes in winter to prepare it without using a drop of water, but this is an infrequent occurrence. The objects to be arrived at are: to thoroughly mix the manure, to sweeten it, to fix the ammonia, and to add just sufficient moisture to carry the crop through. Not more of it should be placed on the heap than the workmen can manage in a day. With forks specially adapted for the purpose, the men then proceed to shake it out, throwing all rubbish away, and taking out merely the longest of the straw. In this and all subsequent turnings the manure should be shaken in little heaps at the workers' feet, and then thrown with a scattering motion to the front, starting the fresh heap about 9 ft. in front of the old one. As this is being done another man, stationed with a hose, must damp it down, a process that requires a good deal of discretion, and one that it is very difficult to describe in print. A rough-and-ready test is this: after a little has been done, draw a handful from the centre and wring it between the two hands. If it leaves them just wet, it will probably be sufficiently damp; if the straw itself is very dry, more water will be necessary. The ground must be kept clear as the work proceeds, using a shovel to throw the droppings to the top of the heap. Care should be taken not to pack the sides too firmly, or they are likely to dry out and will become covered with a white mould. The heap should be made about



5 or 6 ft. high on this occasion, reducing it a little at each subsequent turning. A brisk heat is required at first to fix the ammonia, but the same temperature is not necessary afterwards. The first turning-over always takes half as long again as the later ones, because the heap is consolidated and the rubbish and litter have to be rejected. After an interval of two or three days from damping, the heap must be turned again, starting from the same end as before, provided there is room; if not, it must simply be turned back again. The outside 6 in. at the end should be pulled off and thrown to the top of the heap, then pull down the heap and shake out as at first, throwing the sides into the middle and vice versa. It should be the workman's aim to thoroughly separate and break every portion of the heap. The manure must be tested for moisture as the turning goes on, any spots that show white being damped. If the heap is very dry it is better to soak the top 6 in. with the hose and then turn.

Turnings should afterwards take place on alternate days, arranging so that the last one takes place about the middle of the week, to allow time for the bed to be laid down in the same week. After the manure is ready, no time must be wasted.

Fresh-drawn-in manure will require five or six turns after the damping-out, but manure that has been stacked for any length of time may do with one or two turns less. To be ready for laying down it should have the straw broken into lengths of 3 or 4 in., be free from any offensive smell and give off an odour similar to that of a Mushroom. A further satisfactory test is that when rubbed between the fingers it has a greasy feeling, but is not wet. No moisture should ooze out if a handful of manure is twisted in the hands. A minimum amount of water should be used; only practice will determine exactly how much is necessary, but it is fatal to get the idea that the same amount of water will do for all seasons of the year. The test given above is for the winter and spring crops. For early autumn the manure must be wetter, to compensate for quicker evaporation, and in order that the temperature of the bed may be kept down after it is laid. It will be found, as a rule, that manure that is on the dry side gives a higher temperature in the bed, and moister manure keeps a lower and more even temperature. If it were as easy to grow Mushrooms in the autumn as it is in the winter and spring, prices would certainly not be as high as they are in October and November.

**Indoor Mushroom Beds.**—The next step is the laying down of the beds. Taking flat ones first, it may be stated that whether prepared in Mushroom houses, pits, or glass-houses, the method of laying down is the same, the only difference being in the depth.

It may be taken for granted that it is more economical to put down a bed of 6 to 7 in. in depth, using hot-water pipes to maintain the necessary temperature, than it is to make a bed 12 to 14 in. deep in a cold house, and having to cover heavily with litter for the same purpose. The latter method entails the shifting of the litter at each picking, and one is rewarded by an inferior quality of Mushrooms. The maker of the bed





Photo. J. Weathers

MUSHROOM BED AT ISLEWORTH  
Exposed for picking



Photo. Chas. L. Clarke

A CUCUMBER HOUSE  
The ground space is utilized for Kentia Palms, &c.





should have a stick marked at 14 and 7 in. for a 7-in. bed, which is a good average depth, or 12 and 6 in. for a 6-in. bed. The surface the bed is to lie on having been levelled, the outside of the heap should be cast on top as before, and manure thrown into a small heap in front of the larger. The barrows should then be loaded from this smaller heap, which will ensure good mixing. This point of thorough mixing cannot receive too much emphasis, for on it will depend the uniformity of the bed in moisture and temperature. The contents of the barrows should be tipped out a little way in front of where it is to be laid, in order to give the workmen a clear space. It should not be pitched down by the forkful, but thoroughly shaken and scattered, lightly pressing it down to the 14- or 12-in. mark, keeping the ground cleared up, and using the stick frequently to test the depth. Behind the workman laying down should come a man to tread the manure in a systematic manner, putting plenty of weight on the heels, and working in lines forwards and backwards across the bed. The following day the bed should be brushed over with the back

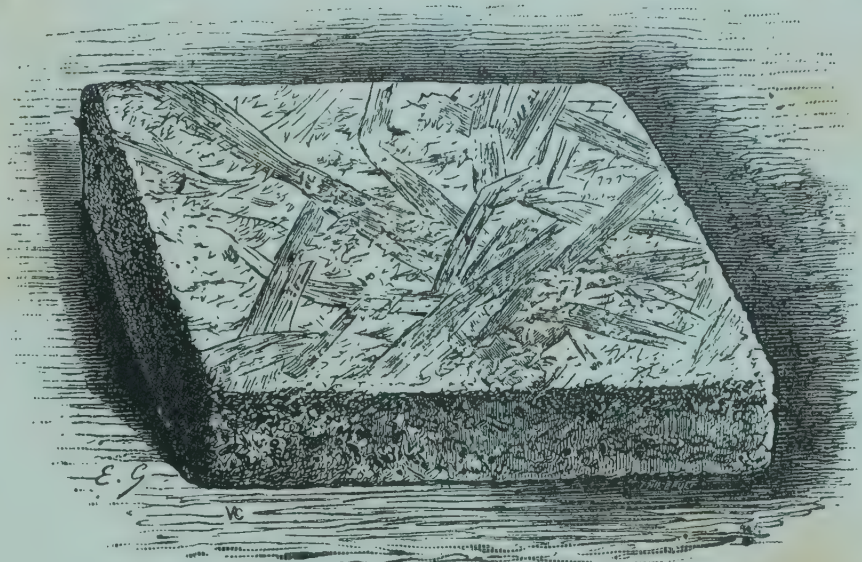


Fig. 479.—A “cake” or “brick” of Mushroom Spawn

of a fork and then trodden twice more, thermometers being inserted afterwards in various places. If they rise to between  $70^{\circ}$  and  $75^{\circ}$  F. during the next two days, and remain fairly constant, spawning may commence. It is not wise to leave the thermometers in a few places only, they should be shifted about several times: there may be a few hot places in the bed. Should the temperature exceed  $80^{\circ}$  it is better to wait a little. If it still rises, holes should be bored in the bed at intervals of 1 ft. and the surface lightly pricked up. As soon as it drops below  $80^{\circ}$  it is safe to spawn, but a bed that does not rise above  $75^{\circ}$  gives the best results. Care should be taken that moisture does not condense on the top of the bed; the surface should be roughed with a fork.

**Spawning the Mushroom Beds.**—It is worth while giving a little attention to the condition of the spawn; for a hot or wet bed hard cakes do best; for a cold or dry bed, green or soft cakes should be chosen. Cheap spawn is not necessarily cheapest in the end. Good spawn costs very little more per house, and usually makes a great deal of difference to the crop, not only as regards quantity, but also in quality. It is usual to break the cakes into six pieces, but the best quality can be broken into



eight; the larger the piece the less risk of all the spawn being killed. Before proceeding to lay out the latter the bed should be levelled over, testing to see that the depth is equal. The spawn should be laid out in lines 10 in. apart both ways, from centre to centre, using marked boards for the purpose. The only tool needed for spawning is a dagger-shaped piece of wood. This is inserted at an angle of about 45 degrees, the manure lifted up, and the piece of spawn put in, outside edge upwards, and about 1 in. below the surface. The bed is firmly trodden as the work proceeds, and it will be found that a large area can be spawned in a short time. If the bed should be too wet, each piece of spawn should have some dry sweet droppings tucked in all round it, to help absorb the moisture—dry, half-rotted litter, or even hay twisted round the cake, will answer the purpose. If the outer surface of the cake once damps, the mycelium or spawn will not be able to get through to the bed.

**Casing the Beds.**—For the casing or landing, good virgin loam should be used if obtainable. If access can be had to a field, pare off the turf in slabs 1 ft. square and 2 in. deep, take out 4 in. of soil, and replace the turf. Weightier Mushrooms will be obtained from this than from old soil. But old soil has generally to be utilized; old Tomato or potting soil often does well, or even soil from an arable field. If it is at all inclined to be sour, lime should be mixed with it, 1 part to 100 being an average dressing. All soil should be put through a screen of  $\frac{1}{2}$ -in or  $\frac{3}{4}$ -in. mesh, and should be moist enough to bind together if squeezed in the hand. Before starting to case, the surface of the bed should be trodden flat with the aid of boards, and then the soil wheeled on the bed on boards to prevent crushing the spawn. The soil is then spread on as evenly as possible with the hands and beaten down firmly with the back of a flat spade or shovel. A depth of  $1\frac{1}{2}$  to 2 in. should be aimed at. Less than  $1\frac{1}{2}$  in. will not hold the "roots" firmly when picking is in progress, and a loss of crop through broken threads will ensue. The casing must be firm.

After the latter process is finished, an even temperature of 70° to 75° F. should be looked for. If lower than this, litter must be placed on the bed. From 3 to 6 in. is often necessary at first, and this should be turned after two or three weeks to allow the air to gain access to the bed, as well as to get rid of any very short stuff, or weeds that may have come up in the soil. As the spawn begins to show, the litter should be reduced gradually, and if necessary fire heat turned on, so that a house temperature of 55° by night and 60° by day is maintained, air being given whenever possible. A little litter is always an advantage on the bed; it prevents quick drying and so much damping down is not necessary. The Mushrooms also are weightier than when it is absent. All the time it is on, a careful watch must be kept to see that the surface of the bed does not become dry. If at any time this occurs, it should be remembered that two or three light dampings at intervals are better than one heavy one. The heavy damping will probably run through to the manure, and once the surface of that becomes too wet, hopes of a crop are nil, for the mycelium will be unable



to get to the surface. When the Mushrooms are peeping through, daily dampings will be required. This should be done with a very fine rose and very lightly each time. Once a day is sufficient in cool weather when fire heat is not used, but two or three times a day may be necessary.

**Picking.**—A damp-over should be given before picking; the Mushrooms are easier to clean after and keep better. For picking, several rows of boards running the length of the house will be necessary. These should be nailed to posts driven into the ground before the house is filled. Short lengths of board that can be moved about are placed across the rows. The mushrooms should be given a twist when they are plucked and laid as near the long boards as possible. Boys with two boxes each then work behind the pickers, cutting off the stalks into one box and putting the mushrooms into the other. In this way they reach the packing shed free from dirt, and give a minimum of trouble. The old stumps should be left till they are shrivelled, when they will come out easily, the holes being filled with good soil at the same time. This helps greatly to prolong the life of the bed.

If the beds are to be in cold houses or pits, they must be 10 to 12 in. deep in the winter, and laid down and trodden in two separate layers; otherwise the procedure is the same as above.

If they are in glasshouses the roofs should be made as dark as possible, either by spraying on two or three coats of clay mixed with oil, or covering them with canvas.

Long rolls of stout brown paper, or canvas laid on wires inside the houses, also help to equalize the temperature and prevent radiation of heat. The idea of this is not to shut out the light but to maintain the atmosphere even in temperature and moisture.

**Outdoor Ridge Beds.**—For these rather different treatment is required. The usual size of winter beds is 3 ft. high and 3 ft. wide. The manure is trodden down very firmly in 6-in. layers, the sides being dressed down to the necessary width, leaving the top about 6 to 8 in. across. As a rule, the temperature will be found to run up rapidly, sometimes to 120° or 130°. Holes 1 ft. apart and about 2 in. wide should be bored from the top nearly to the bottom with a crowbar. These will quickly reduce the temperature, but the base of the ridge will be soonest ready for spawning. Each layer should be spawned when ready. There may be a difference of a week between the start and the finish. The spawn should be inserted rather



Fig. 480.—Mushrooms (*Agaricus campestris*)



closer than in a flat bed, 8 in. each way being a suitable distance, and the pieces should be inserted in an upright position. The holes can be filled up with the rakings off the side, and all made firm.

The soil for casing must be considerably wetter than that used for flat beds, as it must adhere to the bed—2 to 2½ in. at the base and 2 in. at the top will be none too much. It must be beaten very firm, men working from either side with flat spades and beating together against each other. The soil shrinks in drying, so it must not be too wet. Each crack lets out heat and moisture, and the temperature must be maintained. The beds should be placed 9 ft. apart, centre to centre, allowing plenty of room for litter and for moving between them. From 18 in. to 2 ft. of litter may be necessary in the coldest weather to maintain the heat.

In picking, a man should work each side of the bed, uncovering as little as possible at a time, carefully throwing out rotten litter, and damping the bed with warm water if necessary. Each picking should be started from either end of the bed alternately; the litter comes off easier that way. Mats, old sacks, or oiled canvas should be placed on the tops to shoot off the rain, and gullies dug between them to drain the water away.

It is always advisable to grade the Mushrooms well. The chief growers make several sizes of both cups and opens, and overweight is given, as shrinkage by evaporation always occurs.

**Cost of Production.**—It is very difficult to give an estimate as to what a crop of Mushrooms should cost to grow, or of what weight a given area should produce. The cost of manure and labour vary so much, and the skill and experience that are applied to the crop differ so greatly, that only a rash man would care to estimate for his neighbour. A few figures are given below, taken from actual experience, but at the best they can only be taken as a rough guide. A crop was grown in a glasshouse 220 ft. long by 40 ft. wide. For this 600 yd. of manure was bought at 1s. 6d. per yard. It was damped out and allowed to stop for three days, and was then turned six times at intervals of two days, and the day after the last turn the bed was made up. After three treadings the bed settled down to 6 in., and was then spawned and cased. The temperature was kept about 74° F. by means of litter.

The actual cost of the bed, which covered 8200 ft. super., was as follows:—

600 yd. manure at 1s. 6d. per yard ...	...	...	£45	0	0
100 bus. spawn at 2s. 6d. per bushel ...	...	...	12	10	0
Labour ...	...	...	28	0	0
Total ...	...	...	£85	10	0

One man at 25s. a week and four men at 21s. were employed. To the total the cost of soil for casing must be added. In this instance 40 yd. were used. The cost of making ridges is slightly higher in proportion. The labour included: making the manure and putting down the bed; digging and screening soil and casing the bed; putting down the necessary posts

and boards, and all horse labour. The house produced  $5\frac{1}{2}$  tons of mushrooms, but a nearly similar house, put down later, only produced 3 tons, although treated as far as possible in the same way. Probably a fair average for all crops is  $\frac{3}{4}$  lb. of mushrooms per square foot.

Against the first cost of the manure has to be put the value of the spent bed, which will probably be one-quarter to one-sixth of the original bulk of manure (say 100 to 125 yd. out of 600 yd.), and be worth 1s. to 1s. 6d. per yard, according to locality.

Prices of mushrooms vary very much. The following have been average prices for the past few years: October and November, 1s. to 1s. 3d. per pound; December, 9d. per pound; January, 6d. per pound; February and March, 8d. per pound; April and May, 9d. per pound. Summer prices are very much up and down, owing to the difficulty of getting the mushrooms to market in good condition.

For outdoor Mushroom beds in ridges other expert growers estimate the cost at 6s. to 7s. per yard run, and the yield to be from 6 lb. to 10 lb. per square yard. Thus an outdoor ridge Mushroom bed 100 yd. long would cost about £35, and would require 100 tons of manure and about 18 bus. of spawn. Reckoning a yield of 6 lb. of Mushrooms to the square yard on each side of the ridge, the crop would come to about 1200 lb.—over half a ton. At an average price of 9d. per pound the gross receipts would be £45, leaving a profit of £10. To this should be added £2 or £3 for the spent manure, which can be used in other ways.

To ensure regular returns, good manure must be obtained, the labour on its preparation must not be grudged, and, above all things, economy alone should not be considered when purchasing the spawn. A cake of the latter, on being broken, should be full of tiny grey threads just visible to the eye. If the threads are larger, and look like cotton, the results will not be so good.

**Diseases, &c.**—Mushrooms are subject to several diseases, one of the worst being caused by a fungus known as *Hypomyces perniciosus*. This parasite spreads quickly, and distorts the Mushrooms into soft irregular masses of putrid tissue in time. There is practically no remedy, and so prevention should be aimed at rather than cure. Any Mushroom infected with disease of any sort should at once be removed from the house and burnt. Every precaution should be taken to prevent disease occurring. A concrete or clinker bottom should be provided for the manure to be unloaded on as it is brought in, and this should be drenched two or three times a year with a solution of clubicide or similar fungicide 1 to 1000. All spent manure should be carted as far, and as soon, as possible from the houses, and soil that has had spent manure mixed with it should never be used for casing without first being sterilized, either by using the waste heat from the boiler, or treating by steam. Sterilizing by steam has been found to have a marked result on the weight and quality of the crop, and growers may be confidently recommended to give it a trial. Old Cucumber soil answers excellently for casing after being sterilized.



Another pest is the maggot of the Mushroom Fly, a pellucid greenish-white grub from  $\frac{1}{8}$  to  $\frac{1}{2}$  in. long when fully grown. Several of these maggots bore their way from the base of the stalk right through to the cap, and thus destroy the Mushroom. So far no remedy has been devised beyond picking out and burning the injured Mushrooms. The pest no doubt comes in the manure, where the parent has laid the eggs, and these hatch out in the genial warmth of the bed. It may be possible to check the ravages of this maggot by spraying the prepared manure with soft-soap-and-quassia-chip solution a few days before making up into beds.

In conclusion, it should be thoroughly realized by the prospective Mushroom grower that vigilant superintendence by the employer or responsible foreman is at all times necessary. Without it, Mushroom growing is practically doomed to failure. [P. A. C.]

## § 21. ONIONS

The Onion (*Allium Cepa*) is a hardy biennial bulbous plant, and originally came from central or western Asia. It is thought that the name has been derived from a Jewish city called Onion, which once existed near the Gulf of Suez, and was built by one Onias about 173 B.C. As an article of diet the onion has probably been in use from time immemorial. It is said to have been grown by the Egyptians two thousand years before the Christian Era, and gradually found its way across Europe by way of Greece and Italy. Throughout southern Europe the onion is an important article of food amongst the poorer people. Owing to the warmer climate the bulbs are milder and sweeter in flavour than our own produce. The importations of onions are large, over 5,000,000 cwt. being now landed on our shores between January and the end of July.

Either cooked or raw, the onion is very nutritious, and easily digested by most healthy folk. Boiling or roasting makes it more acceptable to delicate people, and amongst its other valuable properties is the one that its juice has the reputation of dissolving calculus in the bladder.

As a British crop the Onion is not extensively grown. According to the Returns of the Board of Agriculture only 4222 ac. are recorded for the crop in Great Britain, while no records appear in the agricultural statistics for Ireland. Bedford seems to be the largest Onion-growing county in the kingdom, having 1000 ac.; Essex has 569 ac., Kent 356 ac., and Worcester 222 ac. Scotland has 191 ac., and Wales 29 ac. Although the British climate cannot compete with that of southern Europe for warmth and sunshine, there is no reason why the most favoured parts of England and Ireland should not make more of the Onion-growing industry. As may be seen from the ash analysis at p. 109, Vol. I, the Onion takes large supplies of potash from the soil, and also, but in smaller proportions, phosphoric acid, lime, sulphuric acid, and soda. The average market-garden crop is from 12 to 15 tons per acre. An average Onion, as sold in the market, weighs about 8 oz., and has a circumference of 10 in. in the widest



part. Many are larger and heavier, but others are smaller and lighter (3 dozen to 1 lb.), and preferred by many. In private gardens, bulbs often weigh from 1 lb. to 3 lb. each.

The great possibilities of Onion-growing may perhaps be realized from the following figures. Assuming the rows to be 1 ft. apart, and the plants, after thinning out, to be 3 in. apart, as a fair distance for market-garden culture, there would be 174,240 to an acre. At an average weight of 8 oz. each the yield per acre would be nearly 39 tons. At £4 per ton this would represent £156 per acre for the matured crop, without counting the value



Fig. 481.—A Heavy Onion Crop, the result of thinning out properly and good cultivation

of the thinnings for salads. If the plants are thinned out 6 in. instead of 3 in. apart, there would be 87,120 bulbs to an acre. These would yield 19 tons on the 8-oz. basis, and £76 per acre at £4 per ton.

From experiments carried out on the *Times* Experimental Farm, 1910, the following results were obtained from a square chain of land from seeds sown in boxes in February, and transplanted, 12 in. by 3 in., in April (174,240 bulbs to the acre). The varieties of Onion were: "Ironhead", 2640 lb. (= 11.7 tons per acre); "Cream Globe", 2878 lb. (= 12.8 tons per acre); "A 1", 3630 lb. (= 16.2 tons per acre); "Nonsuch", 3698 lb. (= 16.5 tons per acre); "Banbury", 3709 lb. (= 16.6 tons per acre); "Wroxton", 3960 lb. (= 17.6 tons per acre); Ailsa Craig", 4950 lb. (= 22.1 tons per acre). [J. W.]



**Market Culture.**—This crop has the valuable advantage of being one of the few possible to a market gardener that need not be marketed at the moment of attaining maturity. A good crop of Onions well harvested will provide something to go to market with all through the winter, and none but those who have experienced it know the worry of the period from Christmas to March, with wages to be met weekly, rent and rates to be paid, baskets and rods to be bought, manure to be got in, with the land nearly all empty requiring cultivation and cropping.

Onions, to be successful, should be grown on clean land. The grower who spares the hoe and lets the weeds go to seed to save wages had better not attempt Onion growing. It is a wise practice, even for the clean grower, to follow Onions after a crop such as Savoy, in which during the previous summer it has been easy to keep the weeds down. The land for Onions should be ploughed up by Christmas, and they pay for a coat of manure.

Sowing takes place at the end of February or beginning of March, as soon as the land is dry enough to be properly worked. In fact the precise time is of less consequence than getting the land in proper order, which includes getting it quite fine and well rolled, for an indispensable cultural condition for Onions is to get the soil well firmed underneath without "panning" it. The seed is sown in drills 8 or 9 in. apart, and 10 lb. of seed are enough for 1 ac. The seed only wants putting just under the ground; in other words, requires but a slight covering of soil.

To get the land in proper tilth for this the last operations must be two-horse harrows, followed by one-horse harrows, followed by one-horse roll, followed by light seed harrows. After drilling, the light seed harrows must be run over the land—only on very light land and in dry weather—followed by the one-horse roll. A very good plan is to run a set of light harrows with well-sharpened tines over the "bed" as soon as the seed has sprouted. This will destroy a good many weeds without hurting the crop. As soon as the seed is well up the hoeing must be taken in hand. The time to destroy the weeds is when they are small; a delay of a day or two then may double the cost of hoeing.

A good many Onion growers let the hoeing by contract. The price in normal seasons on land of average cleanliness is £5 per acre to keep the crop clean and leave it clean on 12 July. Some pay £1 more and extend the time to 1 August. Pay is drawn by the men on the basis of the time put in, although, of course, the grower always takes care to keep sufficient balance in hand for a completion of the undertaking.

As a preventive to Onion Mildew some sow 1 cwt. of sulphate of iron to the acre, and, to improve the keeping quality, 1 cwt. of sulphate of potash before the seed is sown. It is not wise to use manure of a nitrogenous character too freely, as this is apt to make the onions too soft for long keeping. Soot both before and after sowing is a favourite manure with many.

When the tops are quite dried off, the onions are ripe for pulling.

This should be done quickly, because if wet should come the bulbs may start fresh root action; this, besides making them harder to pull, will seriously impair their quality. After they are pulled the onions are left in narrow "windrows" to get well dried and ripened, and then are harvested in lofts or sheds. Wherever they are put the place must be dry, and such as to allow of free currents of air. If the onions are shot thickly on a floor, it is a wise precaution to put chimneys of empty baskets now and then through them. If they show any signs of heating they must at once be turned over, and the bad ones picked out during the process.

The price of onions is generally from £4 to £6 per ton. For "picklers", that is the very small ones, £7 can sometimes be obtained. The crop should be 12 to 15 tons per acre. Good varieties of onion for keeping are *Giant Zittau*, *Up-to-date*, and *Bedfordshire Champion*.

There used to be a considerable quantity of the Tripoli Onion grown, but the practice is not so general now as it was. One reason given for the decrease is that the increased production of onions in Egypt has enabled retailers to obtain a supply just at the time the Tripoli comes in, in a more convenient form and at lower cost. The Tripoli Onion, either *Giant Rocca* or *Red Tripoli*, is sown in seed beds in July, and transplanted in November, in rows 9 in. apart and 6 in. from plant to plant. The crop is ready to pull and bunch in June, when all the home-grown winter onions are finished.

The *Lisbon* Onion, a white-skinned variety, is grown for use as a salad. To pay, it must be sown thickly in the rows, 28 lb. of seed being required to sow 1 ac., the rows being 8 to 9 in. apart. Here also clean land is an indispensable condition to a paying crop. On dirty land the crop is heavily mortgaged before it gets on to the van. The first sowings are made in July, and if successions are desired they should be continued at intervals to late August. The onions are pulled when as thick as lead pencils, bunched in flat or fan bunches, carefully washed, dried on hurdles, and packed for market. The price is 2s. to 3s. per dozen bunches, and a good crop should come off at two to three dozen bunches to the pole. [W. G. L.]

**Spring Onions.**—Considerable breadths of Onions are annually sown in the Evesham district, making a total of 150 to 200 ac. Generally the crop is a paying one, but occasionally prices are so low after the early part of the season that many acres are never cleared, and the Onions are dug in. With February, the young Onion season commences, and their pungent odour may be detected all around Evesham. At the station they impregnate the air as they wait in trucks to be conveyed to the industrial centres northward. Lorries and spring carts laden with them hurry along the streets and roads; they are set down in heaps and hampers in the wholesale markets; down the side streets leading to the market gardens, which literally invest the town up to the walls of its houses, groups of women are discovered in sheds and outhouses, washing, bunching, and tying this medicinally valuable, if odoriferous, esculent; and their presence and occupation may be known long before there is ocular demonstration.



Seed is sown—usually the “White Tripoli”—in July in drills about 9 or 10 in. apart by means of the drill; and besides a little hoeing in late summer, they require and receive no further attention. Those Onions that have grown very freely from any cause are sometimes wholly destroyed by a severe frost—say 25 degrees of frost; so the object kept in view is to have them well grown before December, but not “rank” or overgrown. [J. U.]

**Diseases and Pests.**—Perhaps the worst is the Onion Maggot (*Anthomyia ceparum*), which attacks the young bulbs, and causes the drooping and yellowing of the leaves. Wireworms and other grubs also interfere with the roots in poorly tilled soil. One of the best preventives, and at the same time an excellent cultural operation, is to use the hoe frequently between the rows. This detaches the eggs of the maggot from the young bulbs before mischief is done. The grubs of Wireworms, &c., are also brought up on the surface in view of the birds, which soon destroy them. Strewing soot along the rows, or spraying with paraffin or quassia emulsions, may also be tried, but they are inferior to hoeing, and are probably more costly on the whole. [J. W.]

## § 22. PARSLEY

It has been said that a market gardener's stand should never be without Parsley (*Carum Petroselinum*). Parsley is one of the vegetables of which few growers can manage to dispose of any great bulk, except perhaps two or three growers in Bedfordshire. It does not therefore suit the grower who likes to crop his land with a few crops that can be sold in great bulk, and that require little trouble to grow or little business skill in selling. To keep a constant supply of Parsley, and get the most out of it, require skill and constant watchfulness in the grower, and alertness and push in the salesman.

To keep up a supply, three sowings at least are necessary—in March, in June, and in August. The seed is sown in drills 1 ft. apart. As the Parsley seed is a very long while germinating, it is a good plan to mix with it some seed of a plant that germinates quickly: Radishes or Lettuces are sometimes used for this purpose. Only a small proportion—about one-tenth—of the added seed is necessary, and then, not only are the rows marked for the hoers before the weeds get the upper hand, but the crop, whether of Radishes or Lettuces, can be taken without much injury to the Parsley.

Parsley does best in light soil with plenty of sand in its composition, and it cannot with safety be put upon the same ground again without an interval of a year or two. It is sent to market either bunched or loose in baskets. The period when it is most frequently scarce is from February to April.

Parsley realizes about 2s. per dozen bunches; and loose, 1s. to 1s. 6d. per peck. [W. G. L.]

## § 23. PARSNIPS

The Parsnip (*Pastinaca sativa*) has been grown since Roman times, and has no doubt been derived from the Wild Parsnip of Europe and Britain. Indeed this has been proved by Professor James Buckman, who in 1848 sowed seeds of the wild plant, and succeeded in obtaining three distinct forms by selection in four or five years. One of these was introduced to commerce in 1860, and is still popular under the name of "Student". It has a concave or hollow crown, and is thus distinct from the common form, which has a convex, rounded crown.

It seems strange that such an important market-garden crop as the Parsnip should not be mentioned in the Returns of the Board of Agriculture. It is probably lumped with "other crops". The Department of Agriculture and Technical

Instruction for Ireland, however, takes notice of it, and for the year 1908 records 641 ac. as being grown in Ireland, Leinster having 318 ac., and the county of Dublin 157 ac. The total yield is given as 7238 tons, being an average of 11.2 tons per acre. This is a poor crop, so far as weight is concerned, for such a heavy plant as the Parsnip. As the plants are usually grown in rows about 15 in.

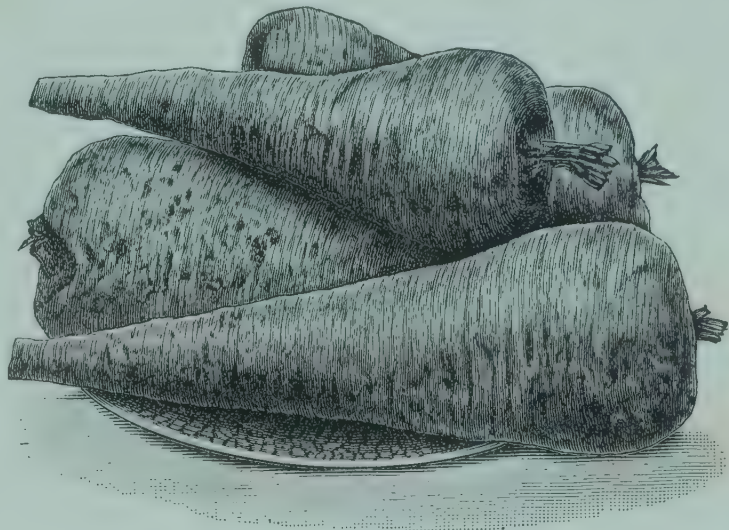


Fig. 482.—Parsnips—"Tender and True"

apart, and about 9 in. apart in the rows, there would be about 43,560 roots to the acre if there were no gaps or failures. As anything like a Parsnip will weigh at least 1 lb., there should be about 19 tons per acre under favourable cultural conditions. Even if 25 per cent is deducted for failures, the crop would come to at least 14 tons. [J. W.]

This important crop has three advantages—it affords a change from the large family of vegetables liable to club; it remains in the land without injury from frost all the winter; and, finally, being a deep-rooted crop, the physical effects of the roots forcing their way down into the subsoil and of their swelling in the soil are very valuable.

Stable manure is not to be recommended in preparation for a crop of Parsnips; it is apt to leave the land hollow and to encourage the formation of "chumps" in the place of straight-rooted plants. The land, however, should be deeply subsoiled, and the previous crop should have sufficient manure to leave the land in good heart. If manure at all is needed for the Parsnip crop a good compounded ordinary market-garden chemical manure may be used, or the land may be dressed with 4 cwt. of agricultural salt and



5 cwt. of dissolved bones to the acre, sown on the furrow before the land is worked down.

The drills are put 15 in. apart, and 10 lb. of seed is enough for an acre, and the seed should not be put deeper than 1 in.

As soon as the young plants have made their third leaf the thinning to a distance of 9 in. in the rows should be done, and done quickly. If the plants are allowed to stand thick long enough to draw each other, they will never quite recover from the weakness and check in consequence.

Parsnips will not do well in shallow soil or chalk, nor in very stony soil; otherwise the crop is so valuable as a change that it is wise to grow as much of it as can be disposed of. But as it is one the sale of which cannot be forced, the grower must feel his way as to the quantity to grow, for although the Parsnip makes good food for stock, if more is grown than can be sold on the market, the cost of digging and disposing of the surplus will make a serious inroad into the profits earned by what has been sold. A crop of Parsnips will cost about £3 an acre for hoeing. The price for best is generally 5*d.* to 6*d.* per dozen; for seconds and "chumps" about 2*s.* per cwt. *Lisbonnais*, *The Student*, *Magnum Bonum*, *Maltese*, and *Tender and True* are good varieties.

The Parsnip is frequently attacked by the Celery Fly, which lays its eggs between the upper and lower surfaces of the leaf, the grub, when hatched, eating out the substance of the leaf.

One or two sowings of soot will make the plants too unpleasant to the flies, and they will seek some other host for their purpose. [W. G. L.]

## § 24. PEAS

This highly popular and widely grown vegetable (*Pisum sativum*), though cultivated in enormous quantities by farmers, who use it as a catch crop on whole summer fallows, and cast the produce on to the market, all the family together, in bags, need not be neglected by the market gardener; because in all large centres of population there is a demand for Peas gathered with discrimination and sent up in baskets.

But the market gardener who goes in for Peas should make up his mind to maintain a regular supply of properly grown, well-picked, not over-matured pods. Once customers learn that he can be relied upon for this, he will find no trouble in disposing of his produce at fair prices, and need not be disturbed by the fluctuations of the bag trade. To do this the varieties to be sown must be selected with judgment each winter, ready for the coming season. Regular weekly sowings should be made of just such a quantity as the grower's scope of land will allow and his organization handle.

In the picking season he will require careful and constant oversight over the pickers. The sorts of Peas change so much every season, and new sorts become obsolete faster than ironclads, that it is almost useless to name sorts to sow. The following, however, may be regarded as good varieties

for market-garden culture: *Eclipse*, *The Pilot*, and *Thomas Laxton*, for first earlies; *Gradus*, *Telegraph*, *Duke of Albany*, *William Hurst*, *Dr. Maclean*, *Duke of York*, *Stratagem*, &c., for main crops.

The worst thing that can be said against the Pea as a crop, from the market gardener's point of view, is that it is so difficult to keep the rows clear of weeds that frequently it leaves a legacy of seed to be contended with next year, the one year's seeding involving the trouble and expense of several years' weeding.

About 1000 pecks of Peas in pod, weighing about 6000 lb., and from 5000 to 6000 lb. of straw can be obtained from an acre of ground.

[W. G. L.]

It is estimated that over 2000 ac. of Peas are annually grown in South Worcestershire; and practically the whole of these are early Peas, generally "Eclipse", supplemented by "William Hurst", "Daisy", and "Senator". "Eclipse" is the variety relied upon for the earliest. These are usually sown in January on warm and sheltered borders facing south, the successional crop being sown practically at the same time on other borders and breadths between the lines of plum trees. The earliest on the borders are usually sown about 18 in. between the rows; the others in larger plots at about 24 in. Sticks are very seldom used. Mid-season varieties are very little grown; and late varieties are entirely omitted commercially. Peas are usually sown where Radishes, Marrows, or Cucumbers have been grown the previous season.

[J. U.]

## § 25. POTATOES

Although regarded by many as being almost exclusively a farmer's crop, the Potato receives considerable attention from the market gardener proper, both in the open air and under glass. Considering its great and universal value as an article of diet, the Potato is extensively cultivated in all parts of the British Islands. Taking the figures from the Returns of the Board of Agriculture and Fisheries, and the Department of Agriculture and Technical Instruction for Ireland, there were 1,175,168 ac. under Potatoes in 1911, against 1,151,632 ac. in 1907. In 1904, however, the area was given as 1,232,055 ac., so that there has been a decline of nearly 60,000 ac. in the course of a few years. Ireland, which had 1,000,000 ac. of Potatoes forty years ago, still grows more than the rest of the United Kingdom put together, including the Channel Islands and the Isle of Man, the Irish acreage for 1911 being 591,269 against 571,801 for the rest of the kingdom, of which 142,629 ac. are in Scotland.

In Ireland, Ulster is the leading Potato-growing province with 243,671 ac., Munster next with 121,655 ac., then Leinster with 111,442 ac., and Connaught very close with 110,376 ac. Of the Irish counties Cork leads the way with 42,761 ac.; the next in order being Down with 41,561 ac.; Mayo, 35,898 ac.; Tyrone, 35,801 ac.; Donegal, 35,390 ac.; Antrim, 33,633 ac.; Galway, 32,678 ac.; Londonderry, 28,394 ac.; Kerry, 21,415 ac.;



Cavan, 21,071 ac.; and Tipperary, 20,846 ac. The smallest Potato-growing county is Kildare, with 5877 ac.; and Carlow, Dublin, Longford, Louth, Meath, Waterford, West Meath, and Wicklow each has less than 10,000 ac. devoted to Potatoes. The counties having between 10,000 and 20,000 ac. each are Armagh, Clare, Fermanagh, Kilkenny, King's County, Leitrim, Limerick, Monaghan, Queen's County, Roscommon, Sligo, and Wexford. On the whole, Potato-growing seems to be general throughout Ireland.

In England, with 391,083 ac. in 1908 and 402,505 ac. in 1911, the principal Potato-growing counties are:—

		1908.		1911.
Lincoln	...	65,738 ac.	.....	71,429 ac.
Yorkshire	...	49,761 „	.....	51,620 „
Lancaster	...	44,575 „	.....	42,814 „
Cambridge	...	25,133 „	.....	30,265 „
Chester	...	23,346 „	.....	21,592 „
Kent	...	14,550 „	.....	14,237 „
Norfolk	...	12,319 „	.....	12,556 „
Durham	...	11,629 „	.....	12,078 „
Devon	...	11,233 „	.....	11,193 „
Stafford	...	10,992 „	.....	10,817 „
Essex	...	10,885 „	.....	11,765 „

The smallest English Potato-growing counties are: Rutland, 212 ac.; Monmouth, 1051 ac.; Westmorland, 1291 ac.; Hereford, 1397 ac.; Dorset, 1671 ac.; Bucks, 1710 ac.; Berks, 1815 ac.; Middlesex (excluding London), 2003 ac.; and Derby, 2323 ac.

This important crop is practically not grown in the district of Evesham; but in Mid-Worcestershire it is largely grown. About Bewdley, Stourport, Kidderminster, Stourbridge, Hartlebury, and Ombersley—districts almost exclusively on the New Red Sandstone formation—many hundreds of acres of Potatoes are grown. The soil is sandy, dry, and warm, and although the plant likes the warm and dry soil it quickly deteriorates, owing to the soil being deficient in the natural food requirements of the Potato. The growers realize this fact and act upon it by obtaining a change of seed at short intervals. A large grower has informed the writer that he finds it profitable to purchase “seed” regularly from Scotland, and that he finds such “seed” gives its best crop during its *second* year of growth here. That is to say, seed saved from the progeny produced by the Scottish seed during its first year of growth in this country gives better results than its Scottish parent.

In Scotland, out of a total of 142,629 ac., the counties of Fife, Forfar, and Perth have 48,436 ac. under Potatoes, the figures being: Fife, 16,342 ac.; Forfar, 16,992 ac.; Perth, 15,102 ac. The smallest Potato-growing counties are: Selkirk, 238 ac.; Nairn, 359 ac.; Peebles, 391 ac.; Clackmannan, 399 ac.; Kinross, 888 ac.; and Bute, 998 ac. The other counties have between 1000 and 9000 ac. devoted to Potato growing.

In 1911 Wales had 26,667 ac. under Potatoes, a decrease of 663 ac. from 1908. The most important Potato-growing counties are: Cardigan, with

5116 ac.; Carnarvon, 3476 ac.; Carmarthen, 3261 ac.; Denbigh, 2538 ac.; Pembroke, 2249 ac.; and Anglesey, 2047 ac. Radnor and Brecon are the two smallest Potato counties, with 670 and 792 ac. respectively. The other counties—Flint, Glamorgan, Merioneth, and Montgomery—have almost a similar acreage under Potatoes, varying from 1465 ac. in Merioneth to 1741 ac. in Flint.

In Mr. A. W. Sutton's paper on Potatoes in the Royal Horticultural Society's *Journal*, 1896, vol. xix, it is noted that the 1,232,055 ac. of Potatoes in the United Kingdom in 1894 gave an average yield of 3 tons 15 cwt. 2 qr. 20 lb. per acre—a miserably poor return, indicative of either very bad cultural methods or very severe attacks of disease—most probably both. The same authority states that in France 3,342,500 ac. are under Potatoes annually, the total yield being 10,100,000 tons, or an average of 3 tons 2 qr. 24 lb. per acre—somewhat worse than that for the United Kingdom.

According to the *Standard Cyclopaedia of Modern Agriculture*, the Russian Empire takes first place in Potato growing with 10,000,000 ac. As the total crop is 28,000,000 tons, the average works out at less than 3 tons to the acre. Germany, with 8,145,000 ac. and a crop of 45,000,000 tons, gives an average of  $5\frac{1}{2}$  tons to the acre. In Austria the average is given as 4 to 5 tons to the acre; while in the United States the average is stated to be only 1 ton to the acre, on the authority of Mr. Eugene H. Grubb, of the United States Department of Agriculture, who visited England and the Continent in 1910. In 1912 there were 3,689,000 ac. of Potatoes grown in the United States, estimated to yield 398,000,000 bushels.

If these figures from agricultural statistics are to be relied upon, it simply means that Potato growing for profit is by no means a lucrative business. An average of 3 tons to an acre would spell ruin in a very short time to the open-air grower. It is possible that the figures are inaccurate, and that from 6 to 8 tons per acre is nearer the mark. Indeed, the figures given in the *Standard Cyclopaedia of Modern Agriculture* show an average of over 6 tons to the acre for the United Kingdom for year 1908, Scotland having 7.30 tons to the acre; England, 6.95 tons; Wales, 5.55 tons; and Ireland, 5.45 tons.

Some counties show much better results. Thus Bedford has an average of 9.58 tons; Ayrshire, 9.29 tons; Lancaster,  $8\frac{1}{2}$  tons; Perth, Forfar, and Lanark, each over 8 tons.

Reckoning the value at £3 per ton, the Potato crop of the United Kingdom for 1908 may be valued at £21,351,000 for 7,117,000 tons, taken from 1,149,000 acres.

Apart from these the Jersey Potato crop, a portion of which is grown under glass, gives an annual yield varying since the year 1883 from 36,468 tons up to 77,800 tons. These Potatoes are all early varieties, and are exported between 1 April and the end of July, realizing as much as £29 a ton for first supplies, but dropping down to £2, 12s. for the last.

Potato growing in Jersey being such an important industry, the follow-



ing official figures, compiled by the Notary Public, Jersey, may be of interest:—

POTATOES EXPORTED FROM JERSEY

Year.					Tons.	Value.			
						£	s.	d.	
1883	...	...	...	...	36,468	.....	262,472	3	4
1884	...	...	...	...	53,655	.....	375,841	18	0
1885	...	...	...	...	48,524	.....	319,464	3	4
1886	...	...	...	...	64,820	.....	309,155	6	11
1887	...	...	...	...	50,073	.....	423,888	18	10
1888	...	...	...	...	60,988	.....	242,109	11	8
1889	...	...	...	...	52,700	.....	264,153	15	0
1890	...	...	...	...	54,109	.....	293,681	9	2
1891	...	...	...	...	66,810	.....	487,642	1	8
1892	...	...	...	...	66,332	.....	376,535	15	10
1893	...	...	...	...	57,762	.....	327,366	13	4
1894	...	...	...	...	60,605	.....	462,895	10	5
1895	...	...	...	...	54,290	.....	359,989	4	6
1896	...	...	...	...	64,583	.....	435,192	0	6
1897	...	...	...	...	53,555	.....	402,274	9	10
1898	...	...	...	...	56,227	.....	338,269	0	0
1899	...	...	...	...	65,040	.....	330,421	0	0
1900	...	...	...	...	54,012	.....	445,872	0	10
1901	...	...	...	...	51,750	.....	320,901	15	0
1902	...	...	...	...	66,625	.....	387,364	5	0
1903	...	...	...	...	47,530	.....	475,888	17	6
1904	...	...	...	...	52,849	.....	233,289	9	6
1905	...	...	...	...	48,170	.....	405,650	3	2
1906	...	...	...	...	51,932	.....	308,229	9	2
1907	...	...	...	...	77,800	.....	377,259	9	2
1908	...	...	...	...	53,100	.....	356,305	1	8
1909	...	...	...	...	62,690	.....	332,403	10	0

The following figures for the year 1909 show when the shipments begin and end, the number of packages, the weight and average price, and the weekly totals for the Jersey Potato crop:—

Date of Shipments.	Packages.	Net Weight in Tons.	Average Price per Ton.			Weekly Totals.		
1909.			£	s.	d.	£	s.	d.
April 5 to May 8	2,978	100	29	18	0	2,990	0	0
May 10 to May 15	17,563	640	20	7	4	13,034	13	4
May 17 to May 22	52,828	1,770	14	14	8	26,078	0	0
May 24 to May 29	113,405	5,000	10	16	8	54,166	13	4
May 31 to June 5	177,646	7,300	7	7	4	53,776	13	4
June 7 to June 12	237,445	9,750	4	2	4	40,137	10	0
June 14 to June 19	268,231	12,210	4	8	10	54,232	15	0
June 21 to June 26	251,825	11,320	3	7	2	38,016	6	8
June 28 to July 3	199,734	9,275	3	13	8	34,162	18	4
July 5 to July 10	87,503	3,875	3	0	8	11,754	3	4
July 12 to July 17	23,568	1,310	2	16	4	3,689	16	8
July 19 to July 24	2,336	110	2	12	0	286	0	0
July 26 to July 29	691	30	2	12	0	78	0	0
Totals ...	1,435,753	62,690	£5	5	6	£332,403	10	0

As there are many parts of Ireland with a climate as equable and genial as that of Jersey, if not more so, there is no reason why the culture of Early Potatoes should not be undertaken on a large scale, especially as it now takes no longer, or very little longer, to send consignments from the south, west, and north-west of Ireland to the English markets than it does from Jersey. Along the shores of Ayrshire and Wigtownshire large quantities of Early Potatoes already are grown for the English markets, but are later than the supplies from Jersey. With good culture and good soil it ought to be possible to grow more Early Potatoes, and thus secure higher prices than is at present the case.

**Cultivation of the Potato.**—Of late years much attention has been given to the best methods of cultivation, and experiments almost innumerable on manuring, spraying, and sprouting have been carried out by various agricultural schools and colleges in England, and by the Department of Agriculture in Ireland. The results of these experiments have been tabulated, but beyond giving a great impetus to the sales of artificial fertilizers and poisonous washes there seems to be little improvement to record so far as the yield of tubers per acre is concerned. Indeed the cultural operations in the great majority of cases seem to have been ignored or not considered. As a rule, nothing is said as to the preparation of the soil, whether it is dug deeply or otherwise, or whether it is ploughed; nor is reference made, as a rule, to the distance between the rows or the number of sets to the acre and their weight. These important points sink into oblivion in comparison with the effects produced by this or that special fertilizer or wash. The results obtained are useful in a way, but they are vitiated to a great extent owing to inferior cultural methods. As a rule, the soil is not cultivated sufficiently deep, and the sets and rows are much too close together. Most potato growers are apparently unaware of the fact that the great bulk of the dry weight of the crop comes from the carbonic acid gas in the atmosphere, under the influence of sunlight, and they are under the impression that the more tubers they put into the ground the greater and better the yield. Nothing could be further from the facts. Indeed, most of our Potato troubles are readily traceable to overcrowding and bad cultivation. It is considered a "waste of ground" to put sets in a yard apart, and too little is spent in labour in preparing the soil in advance.

**The Soil.**—The ideal soil for Potatoes is a deep and gritty loam on a limestone bottom, if possible, or with a fair percentage of lime in it. Such a soil, however, should be deeply worked, and it will pay for the expense, not only because of the large and essential quantities of natural potash (a most important Potato food) that will be liberated, but also because such terrible pests as wireworms, if present, will be brought up and exposed to the keen eyes of the various birds always on the search for food. Ground that is already in a good state of cultivation would cost from 40s. to 60s. per acre to dig one spit deep. Heavy ground covered



with coarse weeds would cost twice or three times as much, and would be cheaper but not better broken up by the plough in the first instance. Digging is always better than ploughing, as a greater depth is obtained, and the soil is broken up into a much finer condition. Consequently it is better ventilated, and its particles are more easily acted upon and rendered fertile by the weather. The analysis of the ash of Potatoes (see Vol. I, p. 109) will give the cultivator some idea as to the foods that are taken out of the soil. To bring the necessary supplies of potash, phosphoric acid, lime, magnesia, &c., into proper, i.e. a soluble, condition gradually, there is only one way, and that is by constant cultivation.

**Manure.**—Perhaps there has been no crop so experimented upon with manures—artificial and natural—as the Potato. Hundreds of experiments have been carried out in all parts of the United Kingdom, on the Continent, and in America, and the results have been most bewildering. Manures, applied in accordance with certain formulæ, that give apparently good results in one place, are practically useless in another. The cost of these special fertilizers varies from £3 to £7 and £8 per acre—often much more than the entire crop would realize without even considering the question of labour, rent, &c.

The following figures, taken from Leaflet No. 38 of the Department of Agriculture and Technical Instruction for Ireland, will show the highest and lowest results of field experiments with Potatoes in the year 1909:—

MANURIAL EXPERIMENTS ON SEVEN PLOTS

Plot.	Manure Applied per Acre.	Highest Yield.	Lowest Yield.	Cost of Manure.
I.	No manure ... ..	7 tons 0 cwt. (Monaghan)	1 ton 15 cwt. ...	£ s. d. —
II.	20 tons farmyard manure...	14 tons 7 cwt. (Wexford)	4 tons 8 cwt. ...	4 0 0
III.	15 tons farmyard manure...	12 tons 7 cwt. (Wexford)	3 tons 15 cwt. ...	3 0 0
IV.	{ 15 tons farmyard manure... 1 cwt. sulphate of ammonia }	14 tons 0 cwt. (Wexford)	5 tons 10 cwt. ...	3 15 0
V.	{ 15 tons farmyard manure... 1 cwt. sulphate of ammonia 4 „ superphosphate ... }	14 tons 5 cwt. (Wexford)	6 tons 2 cwt. ...	4 7 0
VI.	{ 15 tons farmyard manure... 1 cwt. sulphate of ammonia 4 „ superphosphate ... 1 „ muriate of potash ... }	15 tons 17 cwt. (Wexford)	6 tons 9 cwt. ...	4 17 0
VII.	{ 15 tons farmyard manure... 1 cwt. sulphate of ammonia 4 „ superphosphate ... 1 „ sulphate of potash... }	15 tons 2 cwt. (Wexford)	6 tons 13 cwt. ...	4 18 0





SOME FAMILIAR VEGETABLES





This set of experiments shows that the manures which apparently gave good results in Wexford were valueless, if not injurious, in Antrim. It is curious that in all but the "No manure" experiment Wexford County gave the greatest yield, while in every case Antrim gave the poorest. The figures given represent the gross yield, but the quantity of small or unsaleable tubers varied greatly, being 40 per cent in one case, 37 per cent in another, but rarely below 13 per cent.

In a second set of experiments in the same leaflet (No. 38), 15 tons per acre of farmyard manure were given in every case, but the quantities of sulphate of ammonia, superphosphate, and muriate of potash were increased or decreased. Here, again, taking every county in Ireland, the results for Antrim are generally poor in comparison with the results obtained in Wicklow, Wexford, Down, &c., the highest gross yield being in Wicklow—17 tons 7 cwt. (55 cwt. small) from 15 tons of farmyard manure, 1 cwt. sulphate of ammonia, 4 cwt. of superphosphate, 2 cwt. muriate of potash, the cost of which was £5, 7s.

In the year 1899 an elaborate series of manurial experiments with Potatoes were carried out and tabulated at the Agricultural Side Brewood Grammar School, Brewood, Staffs. Thirteen varieties were manured in eleven different ways, making a total of 143 separate plots. The tubers were planted with a mould plough on 4 and 5 May, 1899, but the distance apart between sets and furrows is not stated. It may be assumed, however, that the furrows were 24 to 27 in. apart, and the sets 12 to 15 in. The manures used were nitrate of soda (1 to 4 cwt. per acre), kainit (4 to 6 cwt. per acre), superphosphate (3 to 5 cwt. per acre), and farmyard manure (10 tons per acre). There was also a plot unmanured in any way for each variety. The results of these experiments were rather extraordinary, the difference being very slight in any case. Indeed, the plots that had no manure at all beat those that had, in seven cases. The "no-manure" plot was better than 4 cwt. of nitrate of soda and 4 cwt. of kainit in one case; better than 4 cwt. nitrate and 3 cwt. of superphosphate in two cases; better than 3 cwt. of superphosphate and 4 cwt. of kainit in one case; better than 4 cwt. of nitrate, 5 cwt. of superphosphate, and 6 cwt. kainit in one case; better than 2 cwt. nitrate, 2 cwt. superphosphate, and 4 cwt. kainit in one case; and better than 10 tons of farmyard manure in one case. The greatest yield was 9 tons 17 cwt. from a variety called "Farmer's Glory", and the poorest was 2 tons 17 $\frac{3}{4}$  cwt. from land that had been manured with 10 tons of farmyard manure. The highest yield from the no-manure plot was 7 tons 1 $\frac{1}{4}$  cwt., and the lowest 2 tons 16 $\frac{3}{4}$  cwt.

For several years interesting experiments have been carried out with Potatoes at the Agricultural and Horticultural School, Holmes Chapel, Cheshire. Here again, however, the results leave one entirely in the dark, if not mystified, as to which is the best manure for Potatoes. The following table shows manurial experiments with "Sutton's Reliance" Potato, carried out on ten different plots:—



Plot.	Manures Applied per Acre.	Yield per Acre.				Gross Price of the Produce per Acre.	Cost of Manures per Acre.
		Saleable.	Small.	Dis-eased.	Total.		
No.		T. C. Q.	cwt.	cwt.	T. C. Q.	£ s. d.	£ s. d.
I.	No manure ... ..	0 14 0	11	1	1 6 0	2 13 0	—
II.	{ 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... 1 cwt. muriate of potash ... }	2 19 0	10	1	3 10 0	9 7 0	1 15 3
III.	20 tons farmyard manure ...	4 2 0	11	2	4 15 0	12 17 0	6 0 0
IV.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... }	4 16 0	10	1	5 7 0	14 18 0	6 8 3
V.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia }	4 18 0	13	1	5 12 0	15 7 0	7 1 9
VI.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... 5 cwt. kainit ... .. }	4 2 0	11	1	4 14 0	12 17 0	7 16 9
VII.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... 1 cwt. sulphate of potash }	4 18 0	13	1	5 12 0	15 7 0	7 15 3
VIII.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... ½ cwt. muriate of potash }	5 8 0	13	1	6 2 0	16 17 0	7 8 6
IX.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... 1 cwt. muriate of potash }	5 8 0	15	1	6 4 0	16 19 0	7 15 3
X.	{ 20 tons farmyard manure ... 3 cwt. superphosphate ... 1 cwt. sulphate of ammonia ... 2 cwt. muriate of potash }	4 13 0	14	1	5 8 0	14 13 0	8 8 9

It will be noticed that the greatest gross yield was 6 tons 4 cwt. in No. IX at a manurial cost of £7, 15s. 3d. per acre, while poor results—5 tons 8 cwt.—were obtained in No. X at a greater manurial cost of £8, 8s. 9d. Taking the saleable produce of No. X experiment as being worth £3 per ton, the gross receipt would come to £13, 19s. per acre. Deducting £8, 8s. 9d. for manures, £5, 10s. 3d. per acre—a totally inadequate sum—is left for labour, rent, rates, taxes, &c.

These figures dealing with manures have been given at some length to show that little or no faith can be placed in the experiments. The deductions are fallacious and misleading, and the crops miserably poor as well. Dosing a soil—no matter what its character or texture may be—with certain manures, without applying labour, or “elbow grease”—that old, original, important, and always responsive manure—and without giving a fair amount of space, is practically wasting time, money, labour, and land.

**The Great Manurial Mistake.**—In carrying out all these more or less elaborate manurial trials the fundamental error which naturally leads to utterly wrong conclusions, is the assumption that the soil is the *only* thing to be considered in potato culture. The soil is talked about and written about, and enormous sums of money are lavished upon it, as if it, and it only, contained *all* the material out of which the crop is to be made. Not a word is said about the air and the light, and their absolute necessity to the crop. Perhaps it is because they cost nothing they receive such scant courtesy. And yet the great bulk of the crop—the great weight, after water has been deducted—comes from the carbonic acid gas which is floating about in small quantities with the oxygen and nitrogen of the atmosphere. It is from this gas that all the starch in the potato is obtained, and the starch can only be secured by the healthy action of the leaves when well exposed to sunlight. If growers of crops would only realize this most important fact they would get far finer, cleaner, and healthier crops than they do at present, and at much less cost. It is a most unbusinesslike proceeding to spend from £8 to £10 per acre in manures and fungicides that are not really wanted, to get a crop of 5 or 6 tons of potatoes, when from 10 to 25 tons can be obtained at far less cost by well-known cultural methods. How these good results are to be obtained will be shown below when dealing with the distance that should be given between the rows and sets. In the meantime the following advice may be given in regard to the soil.

1. Dig it deeply, if possible to a depth of 2 ft., and bring the bottom spit to the top at least every third year. In this way the subsoil will become as fertile as the top spit by exposure to the weather, the action of the roots, and the decomposition of well-rotted manure. When the plough is used, the soil should be always subsoiled to a depth of 18 in. if possible. This may seem a dangerous and drastic doctrine to teach, but it will be less costly to carry out than allowing the crops to languish and die for want of moisture at the root in dry summers, or to become water-logged, sodden, and diseased in wet ones.

2. In wet, heavy, clay soils, deep cultivation is far more necessary than in good loamy ones. It is essential to get rid of the superfluous moisture, and thus, by letting in fresh air, not only does the soil become warmer and better drained, but the soil bacteria become more active. Of course the cost of cultivating a bad heavy soil is great, but it must be borne at first if good results are to be secured. After a few years the cost will be comparatively small, but the crops will continue to improve.

3. Light or gravelly soils are almost as bad as wet, heavy ones. They eat up larger quantities of stable manure than a heavier soil, and also require more potash and phosphates. Twenty tons of stable manure per acre would not be too much in a light soil, but a similar quantity might prove injurious in a heavy or loamy soil. In light soils it would also be beneficial to give a dressing of kainit—4 to 6 cwt. per acre—a week or two before planting potatoes; or about 1 cwt. of muriate of potash



might be applied in the same way. When the tops are well through the ground, sulphate of potash—2 to 3 cwt. per acre—may be strewn over the drills, afterwards covering when earthing up.

4. Lime or chalk, at the rate of 80 to 100 bus. per acre, should be given to soils that have been cultivated and heavily manured for years, to rectify any acidity that may have arisen through excessive moisture and putrid organic matter. Where lime or chalk is difficult to obtain, such soils will benefit by a dressing of basic slag, 5 to 10 cwt. to the acre. This should be strewn in the drills at time of planting.

**Sprouting Potatoes.**—The practice of sprouting seed potatoes before planting them is gaining ground amongst farmers as well as gardeners. Shallow boxes or baskets of any description may be used for the purpose, but that most generally useful is a wooden box (see fig. 483) about 2 ft. long, 12 in. wide, 3 in. deep, having four corner posts about 7 in. high. A batten is nailed to each of the two end posts, and a cross handle-

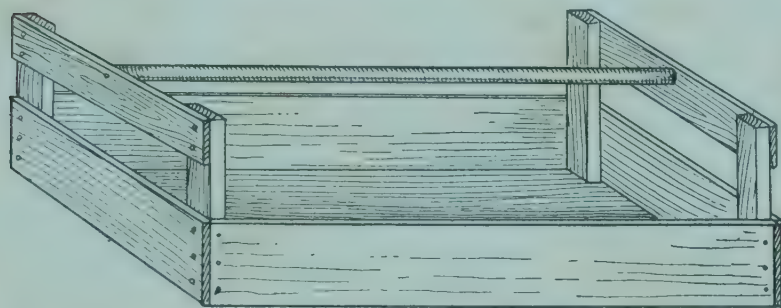


Fig. 483.—Sprouting Box for Seed Potatoes

bar 2 ft. long is fixed from one to the other. This enables a man to carry two sprouting boxes at a time.

The object of sprouting the tubers before planting is to induce growth to start from one or two of the best eyes,

and thus secure active growth in every case. If the tubers are well exposed to the light, but protected from frost, the sprouts will be slow in growth and sturdy; in the dark they would become pale and long, and would be easily broken off, in addition to which the tubers would also shrivel.

Another advantage of sprouting is that planting may be deferred for a month or more beyond the usual time. This is particularly valuable in the case of early varieties, as they can be kept sprouting indoors instead of running the risk of being killed by the early frosts in the open.

The sprouting boxes referred to cost about 4*d.* each, and will hold about 20 lb. of seed potatoes. With fair wear and tear they ought to last for several years, and are so constructed that they can be stacked on each other easily either full or empty.

It is better to have only one layer of tubers in a box, although two layers may be admitted when space and boxes are a consideration. The sets should be examined occasionally after sprouting has commenced, and all sprouts except two or three at the top should be removed. In this way the reserve material in the tuber is directed to the best sprouts, and these in turn will form good sturdy stems, from the base and joints of which masses of fibrous roots will penetrate the soil.

**Does it Pay to Sprout?**—There can now be little doubt of this. Each

tuber planted is known beforehand to be in a growing and healthy condition; consequently there is no danger of blank spaces, so often caused by the non-development of some tubers. Each square yard of land produces its fair supply of tubers (if sufficient space has been allotted), so that the maximum results are secured. The following figures, taken from Leaflet 58 of the Irish Department of Agriculture, show at a glance the advantage to be gained by planting sprouted "seed" potatoes:—

TABLE SHOWING RESULT OF SPROUTED AND NON-SPROUTED POTATO "SEED"

Year.	Number of Centres.	Average Yield per Statute Acre.				Average Gain Due to Sprouting.	
		Sprouted Seed.		Unsprouted Seed.			
		tons.	cwt.	tons.	cwt.	tons.	cwt.
1903	12	11	1	9	8	1	13
1904	34	11	6	8	13	2	13
1905	91	12	17	10	16	2	1
1906	67	11	9	9	2	2	7
1907	67	10	6	8	6	2	0
1908	67	13	0	10	15	2	5
1909	50	12	19	10	4	2	15
Average of 388 tests ... f		12	0	9	15	2	5

Perhaps the only serious argument that can be used against providing boxes for sprouting potatoes is the question of space and light. The boxes themselves, even if they cost 4*d.* each, are not a very serious item; and as they will last for several years, with care, the cost should be distributed over that period. It is, however, useless going to the expense of boxes unless there is some frostproof place to store them; and not only must the place be frostproof, but it should be also as well lighted as possible. Sprouting seed potatoes in the dark would be sheer waste. Any rough barn, with glass side and top light, would do for the purpose, and by allowing free circulation of the air the temperature would not rise high enough to start premature sprouting. The advantage of plenty of light is that it causes the skin of the tubers to turn green, and thus, it may be presumed, perform a certain amount of work in assimilating carbonic acid gas from the atmosphere by means of the chlorophyll corpuscles in the cells. In this way the tubers remain plump and fresh, and do not shrivel, as they would in darkness; and the sprouts remain short and sturdy, and are not so likely to get broken off at planting time. Tubers exposed in this way also resist the attacks of fungoid diseases better than those kept in the dark.

**Size of Seed Potatoes.**—A good deal has been written on this subject, the main point being to discover whether it is more economical to plant large, small, cut, or medium-sized tubers. After many experiments and



some years of experience in Potato growing, we may say that there is little to be said one way or the other if the "seed" is sound and the cultivation good. Sometimes cut tubers will show a slight increase in yield over whole ones, and vice versa. The same holds good with large and small tubers. Indeed some very fine yields have been obtained from experiments in which only potato peelings and cuttings were used. Generally speaking, however, it will be found economical to plant tubers weighing about 3 oz. each, that is, about the size of a hen's egg. The cost of seed per acre will of course depend upon the distance of planting and the current price. Taking prices at £3 per ton, with furrows at 3 ft. by 3 ft., 3 ft. by 1½ ft., 2 ft. by 2 ft., and 2 ft. by 1 ft., the following costs per acre are obtained for seed potatoes:—

Distance apart between.		Number of Sets per Acre.	Weight per Acre, at 3 oz. per Set.	Cost at £3 per Ton per Acre.
Rows.	Sets.			
3 ft.	3 ft.	4,840	8 cwt.	£1 4 0
3 "	1½ "	8,800	15 "	2 5 0
2 "	2 "	10,890	18 "	2 14 0
2 "	1 "	17,920	30 "	4 10 0

The vast majority of growers use about 1½ tons of seed potatoes to the acre, but they will probably be astonished to find that the results are not in proportion to the cost of seed, labour, manures, &c., and that better results are to be obtained with a much smaller quantity of seed.

In selecting seed potatoes, experience seems to prove that it is wise to secure *immature* tubers from a different neighbourhood each year. In other words, it is bad business for a man to plant his own home-saved seed potatoes. At one time there was a general impression that the best seed potatoes came from Scotland. This, however, is by no means the case, as numerous experiments prove that the seed from Ireland is as good as, if not actually more reliable than, the Scottish seed. Irish seed, however, has the reputation at present of not being carefully selected and "rogued". The safest plan would be for English, Irish, and Scottish growers to arrange for an interchange of seed, and thus maintain the vigour of the different stocks by growing them in different soils and climates.

**Planting Potatoes.**—Farmers and many market gardeners use special potato-planting machines for large areas. These machines work on the dredger principle, having an endless chain with a series of cups and hoppers, by means of which the tubers are transmitted down funnels to the drills that are opened with the same machine and afterwards moulded over. Fig. 484 shows the Richmond potato planter of Messrs. J. Wallace & Sons, Glasgow. "In this machine a series of cups fixed to a revolving endless chain lifts the seed from the hopper and deposits the tubers at equal distances in the drills. The width of the planting may

be varied by an arrangement of chain wheels fixed to the frame of the machine. The ingenious design of the cups and the special incline given to the chain prevent doubles from being carried up in the cups, and also minimize the risk of blanks. The machine, drawn by one horse and attended by a lad, can plant from 7 to 8 ac. in one day" (*Standard Cyclopaedia of Modern Agriculture*).

Although a larger area can be covered in a given time by such a potato-planting machine, one must bear in mind that there is great risk in breaking sprouted tubers planted in this way. Where drills are opened proper distances apart with a plough, it would be better to plant sprouted tubers by hand, and an intelligent lad would be able to

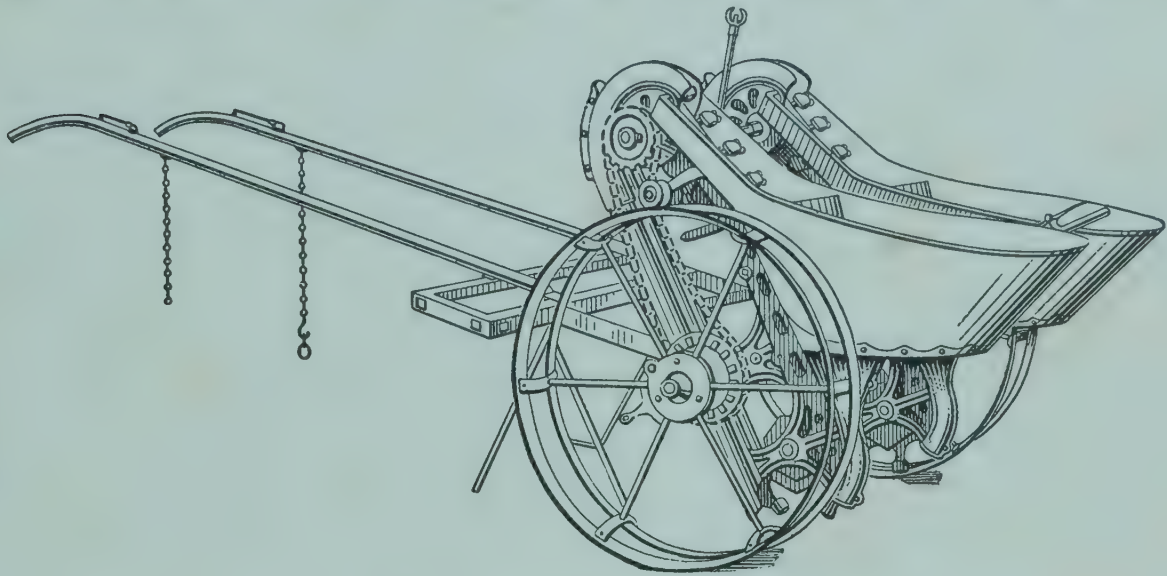


Fig. 484.—Richmond Potato Planter

dispose of several hundreds of tubers in the course of a day. The cost would necessarily be greater, but, as the crop ought to be heavier, there would probably be little difference in the net results. Whatever method of planting is adopted the drills should be not less than 6 in. nor more than 8 in. deep. The work should be performed when the soil is in a dryish and friable condition, so that it is easily worked, and will cover the tubers well when moulded over them.

Many market gardeners have potato ground dug, and the tubers are planted by making holes with a long stout dibber having a cross bar at the top to serve as a handle. There is no particular gain in this, so far as time is concerned, and sprouted tubers run the risk of having the sprouts broken off when they are being dropped into the holes. The more the ground is broken up, either with the spade, fork, or plough, the better and sweeter it becomes, and the more food it yields for the crops. At one time, in the neighbourhood of London, market gardeners used to plant early Potatoes between the rows of Gooseberry and Currant bushes. This method might be practised in young plantations of fruit trees and bushes; but when the latter grow larger they take away so much light from the Potatoes that a comparatively poor crop would



result. Another practice was to plant Potatoes between rows of Cabbages or other dwarf green crops with a dibber, as mentioned, the soil having been previously loosened with a fork. In due course, when the Cabbages were taken off the ground, more air and light were available for the Potatoes.

**Distance between the Rows.**  
—For main-crop varieties it is very rarely one finds a greater distance than 2 ft. or 2½ ft. between the rows, and from 12 to 15 in. between the sets in the rows. Still less space is allotted for early varieties, the general impression being that less is required. Indeed, in Jersey the early Potatoes grown under glass are planted about 9 in. apart in rows 12 to 15 in. asunder, and that very often in soil from which a crop of Tomatoes has only just been cleared. A moment's consideration will be sufficient to show that close planting results not only in poorer crops, but involves greater initial expense for seed and labour, and is very likely to result in a heavy loss through disease. From experiments carried out by the writer in various parts of Middlesex it seems to be conclusively proved by the figures given below that the wider planting of both early and late varieties will yield larger and finer crops, fewer chats, and less disease, in addition to which there will be a considerable saving in the purchase of seed and in the necessary labour of cultivation. The following figures show the difference between allowing a fair amount of space for the plants to grow, and overcrowding:—

TABLE SHOWING RESULTS OF PLANTING POTATOES AT VARIOUS DISTANCES APART. SOIL TRENCHED  
2½ TO 3 FT. DEEP. NO MANURES EXCEPT VEGETABLE REFUSE.

Variety.	Distance Apart.		Number of Sets per acre.	Weight of Sets per acre.	Cost of Sets per acre at 3s. per cwt.	Average Yield per Set.	Greatest Number of Tubers to a Set.	Lowest Number of Tubers to a Set.	Average Number of Tubers to a Set.	Average Weight of Tubers.	Gross Yield per acre in tons.
	Rows.	Sets.									
I. British Queen	...	...	...	...	...	...	...	...	...	...	...
Ia. " "	3 ft.	1½ ft.	8,800	11 cwt. 3 qr.	£1, 15s. 3d.	6½ lb.	—	—	—	—	24½
	2 "	1 "	17,920	27 " 16 lb.	£4, 1s. 5d.	2½ lb.	—	—	—	—	17½
II. Early Puritan	...	...	...	...	...	...	...	...	...	...	...
IIa. " "	3 ft.	3 ft.	4,840	8 cwt.	£1, 4s.	8½ lb.	88	25	45½	3 oz.	18½
	2 "	2 "	10,240	17 "	£2, 11s.	4½ "	53	9	25½	2½ "	20½
III. Duchess of Cornwall	...	...	...	...	...	...	...	...	...	...	...
IIIa. " "	3 ft.	3 ft.	4,840	8 cwt.	£1, 4s.	7½ lb.	64	18	34½	3½ oz.	16½
	2 "	2 "	10,240	17 "	£2, 11s.	3½ "	47	11	22½	2½ "	17½
IV. Myatt's Ashleaf	...	...	...	...	...	...	...	...	...	...	...
IVa. " "	3 ft.	3 ft.	4,840	8 cwt.	£1, 4s.	4½ lb.	53	24	38	2 oz.	10
	2 "	2 "	10,240	17 "	£2, 11s.	2 "	53	11	26	1½ "	9½

These experiments are interesting, as they show conspicuously the absurdity of the popular fallacy that one is "wasting ground" by giving Potatoes sufficient space to grow. In No. I, "British Queen" Experiment, it is obvious that at 3 ft. apart not only did the seed cost £2, 6s. 2d. per acre less, but there was a gain of over 7 tons to the acre against the Potatoes at 2 ft. apart. This at £3 per ton would represent another £21. If there was any truth in the statement that it is "wasting ground" to give so much space, it is obvious that at 2 ft. by 1 ft. apart the 17,920 sets should have given at least twice as great a yield (i.e. over 49 tons per acre) as the 8800 sets. But they actually gave over 7 tons less—representing a great loss. Again, for every set planted at 3 ft. by 1½ ft. apart the average yield was well over 6 lb. per set, while at 2 ft. by 1 ft. the average was just over 2 lb. per set.

The "Early Puritan" Experiment II again shows that there is nothing gained by planting too close together. Although the 17 cwt. of seed produced 20½ tons to the acre, the average yield per set from the 2-ft.-by-2-ft. rows was only 4⅙ lb., against 8⅞ lb. from the 3-ft.-by-3-ft. rows; and the average weight of the individual tubers was greater in the rows farther apart. Another important point in this experiment was that in the 3-ft.-by-3-ft. rows the average number of tubers to each plant was 45½ against 25½ from the 2-ft.-by-2-ft. rows. There was a larger quantity of "chats" amongst the tubers from the 2-ft.-by-2-ft. rows, so that the extra yield of 1⅔ tons to the acre was swallowed up by inferior produce, and signs of disease that were absent from the 3-ft.-by-3-ft. rows.

In Experiment III, with the variety "Duchess of Cornwall", precisely the same result is shown as in the others. The extra yield of 1⅓ tons in the 2-ft.-by-2-ft. rows was again spoiled by the number of chats. The average number of tubers per set in the 3-ft.-by-3-ft. rows was 34⅔ against 22⅔ in the rows 2 ft. by 2 ft.

In Experiment IV with the early variety, "Myatt's Ashleaf", it will be noticed that there is a big drop in the yield per acre, and also in the average weight of the tubers in comparison with the mid-season and late varieties. Still, even at 3 ft. apart every way, there was a better result than with the rows and sets 2 ft. apart.

**Overcrowding and "Chats".**—From a commercial point of view it is essential to secure as small a quantity of chats as possible in a potato crop. To secure this desirable result it is necessary to give sufficient space between the rows and the "sets". The following results from a square pole of ground show that fewer small tubers will be produced by planting at 3 ft. apart than by planting at 2 ft. apart:—

#### V. "WARE" AND "CHAT" EXPERIMENT—"MYATT'S ASHLEAF"

Distance every way.	Large Tubers.	Small Tubers.	Total Number.	Per cent of Chats.	Per cent of Ware.	Total Weight.	Average per Tuber.
3 ft. apart	822	298	1120	26·6	73·4	140 lb.	2 oz.
2 ft. apart	897	798	1695	47·0	53·0	128 „	1⅓ „



This experiment again is a strong argument in favour of wider planting than usual. Not only is a heavier crop produced at less cost, but the general sample in the 3-ft.-apart plots will be superior to that from the 2-ft.-apart ones.

“Cut” versus “Whole” Sets.—This matter is frequently debated, but, so far as actual results go, there is very little to chose between good medium-sized sets (say about 3 oz. each) and cut sets of large potatoes, as may be seen from the following figures:—

VI. EXPERIMENT—WHOLE SETS VERSUS CUT SETS—MYATT’S ASHLEAF

14 of each	Yield.		Total number of Tubers.	Total weight of Tubers.	Average Weight per Tuber.
	Large Tubers.	Small Tubers.			
Whole sets	303	340	643	45 lb.	1·1 oz.
Cut sets ..	303	235	538	42½,,	1·2 ,,

It will thus be seen that although there was 2½ lb. more weight from the whole sets than from the cuts, and 643 tubers against 538, the average weight of the whole-set tubers was slightly inferior to those of the cut-set tubers. Somewhat similar results were obtained in experiments carried out at the Cheshire County Council’s Agricultural and Horticultural School in 1899, as the following figures testify:—

CUT SETS VERSUS WHOLE SETS

Average for the Year.	Saleable.		Small.		Diseased.		Total.	
	Cut Sets.	Whole Sets.	Cut Sets.	Whole Sets.	Cut Sets.	Whole Sets.	Cut Sets.	Whole Sets.
1896	T. C.	T. C.	cwt.	cwt.	cwt.	cwt.	T. C.	T. C.
1896	11 4	12 6	7	15	—	1	11 11	13 4
1897	11 14	11 10	31	19	22	24	14 7	13 13
1898	16 0	16 8	13	15	4	4	16 17	17 6
1899	12 15	13 3	26	24	5	5	14 6	14 12
Average for 4 years	12 18	13 7	19	18	8	8	14 5	14 14
Difference	—	9	1	—	—	—	—	9

In connection with this experiment it was remarked: “In planting cut and whole sets there appears to be very little difference in the yield. The average returns of sixteen trials during four years with eight varieties show that whole sets give slightly better results, with a gain of 9 cwt. of saleable potatoes per acre, and that cut sets gave 1 cwt. per acre more

chats than whole sets; but it was observed that the size of saleable potatoes was larger from the cut sets."

**Earthing up and Sunshine.**—Another point in potato culture intimately associated with the distance given between the rows and sets is the question of earthing up, and the direction. In experiments carried out with "Myatt's Early Ashleaf" it was shown that a greater yield, fewer chats, and better samples were obtained from sets planted 3 ft. apart every way than from 2 ft. apart. To see whether there was any difference between moulding up the rows north and south and rows east and west another experiment was carried out under identical conditions. The sets were 3 ft. apart every way, the only difference being that in one case the earth was drawn up in ridges running north and south, and in the other east and west, with the following results:—

EARTHING UP "NORTH AND SOUTH" VERSUS "EAST AND WEST"

Ridges running	Distance between Rows and Sets.	Large Tubers.	Small Tubers.	Total per rod.	Weight per rod.	Total per acre.
North and south	3 ft. by 3 ft.	822	298	1120	140 lb.	10 tons.
East and west	3 ft. by 3 ft.	653	355	1008	114 lb.	8 tons.

From this it will be seen that such an operation as earthing up may mean a profit or loss to the grower according to the way it is done. Although the sets were 3 ft. apart every way, the fact that the rows were moulded up east and west instead of north and south meant a loss at the rate of 2 tons to the acre, and a worse sample into the bargain. The reason of course is quite plain. By earthing up north and south the rows are fully exposed on both sides to the sunshine at midday, when the work of assimilating carbonic acid gas from the atmosphere is going on rapidly to make tissue and tubers. The soil is also warmed on both sides, and providing it contains sufficient moisture and soluble food the best results may be anticipated. By earthing the rows up east and west, however, the grower is distinctly taking money out of his own pocket, as the experiment shows. At midday only one side—the south—of the rows catches the sunshine, while the other side—the north—is in perpetual shade. Not only is this the fact, but all rows after the first one may be said to be more or less deeply shaded on the south side also. Hence but very little warmth from the sun reaches the soil, and, the genial warmth so essential to growth being lacking, the root action is poor in consequence, and less food is taken up to the leaf cells to be acted upon by the light.

The Dutch scientist Jan van Ingenhousz, who published his researches in 1779, was the first to discover that all green-leaved plants fed upon the carbon in the air during the daytime by means of the millions of minute pores or stomata on their leaves; but very few practical growers



appear to have taken advantage of the knowledge which has since been at their disposal. The facts and figures given above show that not only is a fair amount of air and light essential to good growth, but it will pay the cultivator to bear this knowledge well in mind when planting any crop. With such an important crop as Potatoes, hundreds of thousands of pounds are lost every year simply because a man thinks he would be “wasting ground” by planting his sets 3 ft. apart. The reverse is really the case, and growers will find it to their advantage in many ways to give their potato crops more room than is at present customary.

**Cost of Cultivation, Profits, &c.**—As stated at the commencement of this article, an average yield of 3 tons of potatoes per acre would not pay any grower. By judicious amounts spent in labour and cultivation it is possible, however, to secure fairly good profits on the system here recommended. To show the difference between this and the old or usual system the following tables of expenses and receipts will probably carry conviction:—

ORDINARY SYSTEM

<i>Expenses</i>				<i>Receipts</i>			
Ploughing and harrowing...	£1	0	0	8 tons (2 to 3 tons above			
Stable manure, 12 tons,				the average) @ £3	...	£24	0 0
@ 5s. ... ..	3	0	0				
Artificials ... ..	1	0	0				
Seed, 30 cwt., @ 3s. ...	4	10	0				
Rent ... ..	2	0	0				
Planting 17,000 tubers ...	0	15	0				
Hoeing—one man, 5s.; two							
horses, 4s ... ..	0	9	0				
Earthing up ... ..	0	7	6				
Lifting (machine) ... ..	0	15	0				
Miscellaneous ... ..	1	0	0				
		14	16 6				
Net profit per acre ...	9	3	6				
	£24	0	0			£24	0 0

THE WRITER'S SYSTEM

<i>Expenses</i>				<i>Receipts</i>			
Digging 1 ac. ... ..	£3	0	0	15 tons (5 to 10 tons below			
Planting 4840 tubers ...	0	15	0	what may be obtained)			
Manures as above ... ..	4	0	0	@ £3 ... ..	£45	0	0
Seed, 8 cwt., @ 3s. ...	1	4	0				
Hoeing as above ... ..	0	9	0				
Earthing up ... ..	0	7	6				
Rent ... ..	2	0	0				
Lifting by fork ... ..	2	0	0				
Miscellaneous ... ..	1	0	0				
		14	15 6				
Net profit per acre ...	30	4	6				
	£45	0	0			£45	0 0

These figures may be taken as applying chiefly to late or main-crop varieties of Potatoes. If the work of preparing the ground is done with the spade or the fork it will be done much better than if the plough is used. Although the ground is got over more quickly by machinery than by hand labour, it is a question whether it is not really the more costly method of cultivation in the long run. The soil is never so well cultivated or kept so clean with the plough and harrow as it is with the spade and the fork, and the latter system has the additional advantage of giving more men employment and of having them available for other kinds of work that cannot be done by machinery. It will be noticed that while there is very little difference in the total cost per acre between the two systems, there is likely to be a vast difference in the results. With main-crop Potatoes, planted 3 ft. every way, and earthed up north and south, in ordinary good potato soil, a yield of 15 to 18 tons of "ware" potatoes may be anticipated against the 5 or 6 tons obtained in the ordinary way. It will probably be a long time before potatoes will be grown in field or garden in the way recommended, as it is hard to kill established customs, no matter how absurd they are proved to be; and the wasteful and extravagant "lazy-bed" system of planting, still practised largely in Ireland, will no doubt hold sway for some time to come.

**Potato Diseases.**—Of late years the diseases of Potatoes have attracted considerable attention, so much, indeed, that it has become quite usual to talk about various sprays and washes for eradicating or preventing them instead of adopting better cultural methods. Diseases, of course, are natural adjuncts to all living things, including Potatoes, but there is no need to invite their appearance by neglecting the dictates of common sense. It may be safely said that most of the Potato diseases are mainly due to three causes, viz.: (1) overcrowding; (2) lack of sufficient lime in the soil; and (3) absence of deep cultivation. Remedy these defects, and less will be heard in the future of Potato diseases. The air and sunshine, for which growers pay absolutely nothing, are the finest natural antidotes to disease in the leaves and stems of Potatoes, while a well-worked soil containing a fair supply of lime or chalk in one form or another will do much to prevent the diseases of the tubers.

The grower, however, must be always on his guard against attacks, and it is well that he should be acquainted with or be able to recognize the various Potato diseases here described.

**The Common Potato Disease, or Potato Blight,** is caused by a fungus called *Peronospora infestans* (fig. 485). The spores of this fungus are produced in enormous quantities, and, being very minute, are easily blown about by the wind from one place to another. The disease was discovered in Boston, U.S.A., and also in Denmark and Norway between 1840 and 1842, and by 1845 and 1847 it had ravaged the whole of Europe, and caused the great Irish Famine.

The first signs of this terrible disease are small brownish or yellowish blotches on the leaves; these blotches gradually increase in size, the



leaves also begin to curl, and in severe cases the stems and leaves become blackened in the course of a day or two—especially in warm damp weather and when the Potatoes are planted too close together, as they usually are. Examination of the affected portions with a good lens or a microscope will show white and delicate threads. These are simple or branched stalks or conidiophores, which spring, through the leaf pores (stomata), from the mycelium of the fungus already feeding in the tissues of the leaf. At the tips of these delicate branches egg-shaped and colourless sacs, called conidia, are borne. From each of these conidia, when ripe, a number of zoospores are distributed. Each zoospore in due course germinates under the conditions mentioned, and sends a germ tube into the leaf tissues either

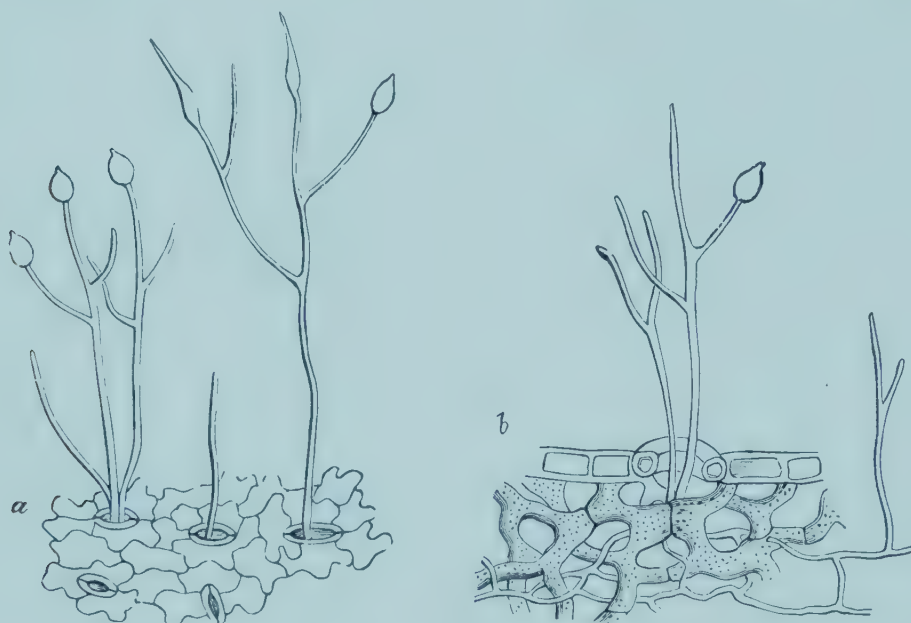


Fig. 485. — *Peronospora (Phytophthora) infestans*

*a*, Fungus, with spore cases proceeding from stomata. *b*, Section of Potato leaf, showing the mode in which the mycelium creeps amongst the loose tissue of the leaf.

through a stoma or the epidermis itself. Thus the disease spreads with great rapidity, and not only are the leaves and stems affected, but the tubers also, if so exposed that the spores fall upon them.

The usual remedy recommended for the Potato disease is Bordeaux mixture (a recipe for which is given by Mr. George Massee in Vol. III, p. 49), and there is no doubt as a preventive it is worthy of recommendation. The commercial aspect of spraying with Bordeaux mixture may be gleaned from the following statement of Mr. A. W. Sutton, who carried out an experiment on two plots of Magnum Bonum Potatoes—one being sprayed, the other not. One plot was sprayed three times, the other not at all. The effect was very marked. The growth of the sprayed plants continued some time after the unsprayed portion had died down. The weights of the two plots, when lifted, were: *Sprayed*, 3 cwt. 1 qr. 25 lb., *Unsprayed*, 3 cwt. 1 qr. 4 lb., a balance of 21 lb. in favour of the sprayed plot. Strange to say, the quantity of diseased tubers was the same in both plots, viz. 4 lb. "It is therefore a question", says Mr. Sutton, "whether the additional weight per acre would compensate the grower for the some-

what laborious task of spraying his crop three times during the growing period."

Somewhat similar results have been secured by the Department of Agriculture and Technical Instruction for Ireland. In its leaflet (No. 14, revised) is given the results of a series of experiments in spraying Potatoes with solutions of: (1) Sulphate of copper and lime, and (2) Sulphate of copper and washing soda. Here are the figures:—

	No. of Tests.	Mixture Used.	Average total yield per statute acre.				Increase attributed to Spraying.	
			Sprayed.		Unsprayed.			
			tons.	cwt.	tons.	cwts.	tons.	cwt.
Average	15	Sulphate of copper and lime ...	11	15	10	1	1	14
„	18	Sulphate of copper and washing... } soda (carbonate of soda	12	5	9	15	2	10

The grower must decide for himself whether the use of 20 lb. sulphate of copper and 25 lb. of washing soda, or 20 lb. sulphate of copper and 10 lb. lime (the quantities required per acre) will repay him for the trouble and expense involved if he is only to secure a benefit of 34 cwt. per acre in one case and 50 cwt. in the other, including, presumably, diseased tubers and chats. We feel sure better results will be secured at less expense and trouble by wider planting, as already advised at p. 144. Nevertheless, for the benefit of those who prefer to spend their money in washes and sprays rather than in better cultural methods, we give the recipes for making the mixtures from the Irish Agricultural Department's leaflet, copies of which, of course, can be obtained on application.

RECIPE I. *Sulphate of Copper and Washing Soda (Burgundy Mixture).*—The mixture is made in the following proportions:—

- 2 lb. sulphate of copper, 98 per cent purity.
- 2½ lb. washing soda, 98     "     "
- 10 gal. of clean water.

For large areas it is recommended to make up four times the above quantities in a 40-gal. paraffin barrel in the following way: "Thoroughly wash out the barrel and pour into it 35 gal. of clean water. The 8 lb. of sulphate of copper should then be put into a canvas bag, or tied up in a piece of canvas cloth, and put into and moved about in the water in the barrel until the crystals are dissolved. This operation can be more quickly accomplished if the crystals of sulphate of copper have been previously ground.

"Having prepared the solution of sulphate of copper, next dissolve the 10 lb. of washing soda in 5 gal. of water in a separate vessel. Then pour the washing soda solution slowly into the copper sulphate solution in the barrel, stirring continuously. The mixture should then be ready for use."



In case the mixture is not quite properly made, owing to differences in strength of the materials, it may be tested with a piece of blue litmus paper, which can be obtained from almost any chemist cheaply. If the blue litmus paper turns red, more washing soda should be dissolved and added in small quantities, with continual stirring, until the litmus paper retains its blue colour.

RECIPE II. *Sulphate of Copper and Lime.*—

- 2 lb. sulphate of copper, 98 per cent purity.
- 1 lb. unslaked lime of the best quality.
- 10 gal. of clean water.

This may be made up in a 40-gal. paraffin barrel also, using four times the quantity of material. Proceed as follows: "Dissolve the sulphate of copper exactly as has been described in Recipe 1, viz. dissolve 8 lb. sulphate of copper in 35 gal. of water in the paraffin barrel. Next prepare the milk of lime. For this purpose procure a wooden tub holding 5 gal., and also a bucket. Put into the bucket 4 lb. of good freshly burnt unslaked lime. Sprinkle it with sufficient water to change it to a powder. Then add sufficient water to fill the bucket. This, when it has been well stirred up, will make a thin milky fluid. Pour this into the tub, and add thereto sufficient water to cool the mixture and to bring the quantity up to 5 gal. After being thoroughly stirred it may be slowly poured through a fine sieve—such as is usually sold with spraying machines—into the barrel containing the copper sulphate solution. The contents of the barrel should be continuously stirred while the milk of lime is being added to it.

"The mixture should then be of a bluish colour and ready for use, but in order to secure the best results the blue-litmus-paper test should also be applied to it. If the paper turns red, a further quantity of milk of lime should be prepared, and added in small quantities at a time to the mixture until fresh paper put into the solution remains blue. It should then be applied with as little delay as possible, and the mixture should be well stirred each time before the sprayer is filled."

It is better to dissolve the sulphate of copper and washing soda in hot water instead of cold. If kept separate they will last for several days, but once mixed they should be applied immediately. If the mixture is kept even for a day it rapidly deteriorates, and is then much more readily washed off the plants by rain. All vessels coming in contact with sulphate of copper (which is poisonous) should be of *wood*, and not of metal. Spraying with a high-pressure sprayer is recommended three times during the season, the first time being early and before the appearance of any blight. Dry weather is obviously best for the purpose.

**Potato-leaf Curl** is a disease caused by *Macrosporium Solani*, which causes the stems to become more or less stunted, the leaves small, and the leaflets much curled, and in many cases the shoots do not appear above ground, thus causing gaps in the rows. The fungus appears to

spread upwards from the tubers, thus preventing the rise of the sap and causing the stems and leaves to “flag” or wilt (fig. 486). As a rule the leaf-curl disease causes the tubers to remain hard and firm, and prevents the natural fermentation for proper growth. Perhaps the best remedy against this disease is to obtain immature or at least not over-matured “seed”; to sprout all tubers before planting; and to dress the deeply dug ground with slaked lime or chalk—about  $\frac{1}{2}$  bus. to 1 rod—if much stable manure has been used.

Mr. W. P. Lasham (Messrs. Sutton & Sons’ potato expert at Reading) is strongly of opinion that Potato Curl is due to over-maturing of the seed, because scarcely a crop grown from Scotch seed suffers from the disease. He has always found that immature seed did not suffer from “curl”. In the case of mature or over-mature seed, the old set is found nearly always as sound as when planted. This is never the case with immature seed. Mr. Lasham thinks that there is not sufficient moisture in mature seed to enable the tuber to decay quickly enough to yield its nourishment to the sprouting stems and root fibres.



Fig. 486.—Potato Leaf Curl Disease

**Potato Scab.**—This is caused by *Oospora scabies*, a fungus that usually attacks the young tubers, forming scattered roughish patches or scabs on the surface, sometimes spreading all over. To prevent this disease from spreading, only healthy unscabbed tubers should be planted, and the ground should be deeply dug and allowed to sweeten by exposure to the atmosphere before planting. If too much stable manure has been used, lime should be added to rectify it; or if too much lime has been used (as is sometimes the case), then well-rotted stable manure may be dug in the previous autumn or early in spring.

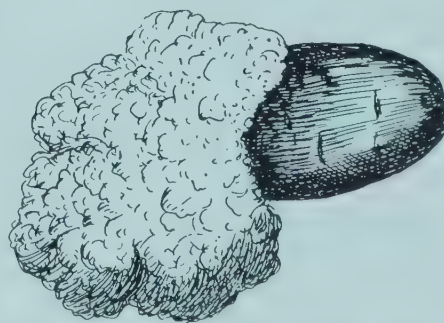


Fig. 487.—Black Scab or Warty Disease of Potatoes

**Black Scab or Warty Disease.**—This is also known as Canker and Cauliflower disease (fig. 487), the latter name arising from the fact that large irregular, crested, or mossy outgrowths, like pieces of dirty Cauliflower heads, are produced on the tubers. This disease is caused by a fungus, *Synchytrium* (*Chrysophlyctis*) *endobioticum*, and is more prevalent in some districts than in others. It first appears in the form of warts or wrinkles near the eyes of the young tubers, and later on several of these warts, growing together,



form a spongy brownish or greenish scab, which finally becomes black. The disease (which is notifiable under the Destructive Insects and Pests Acts, 1877–1907) is said to cause most damage in gardens or allotments where potatoes are grown every year. This is doubtful, as the writer knows a garden where large quantities of potatoes have been grown year after year for the past fifty years, and the Black Scab or Warty Disease has not yet made its appearance. The soil in this case, however, is fairly well and deeply cultivated and manured, and occasionally limed—methods which will apparently render almost any ordinary soil immune from the disease. Badly afflicted ground, however, should be trenched or subsoiled with the plough, and gas lime or freshly slaked lime, at the rate of 4 or 5 tons to the acre (56 to 70 lb. to the square rod), should be worked in.

**Winter Rot.**—This fungoid disease, caused by *Nectria Solani*, attacks stored potatoes, especially in moist or dark and warm situations. The skin begins to shrivel and shrink, and white patches of fungus appear on the surface, and in due course the crop of spores produced affect surrounding tubers. To prevent attack, potatoes should be stored in cool, dry, and well-ventilated places, and even then not in great heaps, but in flat layers if possible. The tubers should be thoroughly dry before storing, and flowers of sulphur may be sprinkled over and about them to kill or check the fungus. Any diseased tubers should be picked out from time to time and burned.

**Insect Enemies.**—The worst of these are the Millipedes or Julus Worms and Wireworms. The former are often present in badly cultivated but highly manured soil, and cause a scabby appearance on the tubers. Wireworms are generally present in freshly broken-up pasture land, and can only be eradicated by frequent digging or ploughing, and by encouraging crows, chickens, and other birds to pick them out of the freshly broken soil.

**Kinds of Potatoes to Grow.**—There is a vast difference between the man who grows Potatoes for private use and the one who grows for sale. In the first case quality before quantity is the maxim. In the second, quantity above all things, but quality in addition, if possible, is the guiding star. Even amongst commercial growers there is a vast difference of opinion as to which varieties are likely to yield the best returns. The Jersey growers of early Potatoes almost to a man favour the “Royal Kidney” (or International), while the Irish growers still stick to the old “Champion”. Indeed some 320,785 ac., or more than half the total for Ireland, are recorded for 1908 as having been planted with this variety. “Up-to-Date”, with over 92,000 ac., is a bad second; while “Beauty of Bute”, “Black Skerries”, and “Flounders” (another very old Irish Potato) are bad thirds with over 30,000 ac. each. Then come “Sutton’s Abundance” (21,900 ac.), “British Queen” (20,477 ac.), and “Irish Whites” (17,120 ac.). The rest—“American Early Rose”, “White Elephant”, “Gawkies”, and “Scottish Triumph”—are simply nowhere at present so far as Ireland is concerned. Such fine croppers as “The Factor”, “Duchess of Corn-

wall", "King Edward VII", &c., are grown, if at all, only in very small quantities.

The following varieties may be recommended for commercial purposes:—

*First Earlies.*—Ashleaf, Duke of York, May Queen, Ninetyfold, Ringleader, Early Puritan, Snowdrop.

*Second Earlies.*—British Queen, Beauty of Hebron, Windsor Castle, Duchess of Cornwall, Royal Kidney, Sir John Llewellyn.

*Main-crop Varieties.*—Up-to-Date, Factor, Scottish Triumph, Table Talk, King Edward VII, The Scot, The Colleen.

"Boom" varieties, like "Northern Star", "Eldorado", and others, may be regarded as worthless croppers, although they have served a turn. And all the talk about a disease-resisting Potato may be considered as nonsense. Wherever life exists, disease is always possible, especially under unhealthy conditions. [J. W.]

## § 26. RADISHES

This crop (*Raphanus sativus*) needs light warm soil which has enjoyed high cultivation long enough to contain a good deal of humus. The secret of producing good Radishes is to grow them quickly; if they take long in coming they become tough and hot, instead of being mild and nutty in flavour.

Stiff land will not do for Radishes, because not only is it too cold, but the Radishes cannot be pulled, after they are grown, without tearing off the top, which is fatal. For early sowings a warm border with a gentle slope to the south is desirable. Formerly sowings began in January and were covered with litter, successive sowings being made each fortnight, the first without litter being made in March. The litter was raked off as soon as the seeds began to appear through the ground.

Elaborate arrangements of string, feathers, and boys to pull them and shout ("when the gov'nor was believed to be near") were made to scare the birds. At sign of frost all hands were called at evening to shake the litter over the beds again, to be again raked off as soon as the frost was gone, perhaps the next day. This process went on, every raking off lessening the number of Radishes, until the end of March, when the litter was carried off and stacked. The method of sowing was to mark the ground out with marks 6 ft. apart. The surface was then carefully levelled with rakes. The levelling was important in order to get all the seed through at the same time, to shorten the period of bird scaring, which had to be kept up until the seedlings were too big to be pulled up. The seed was sown broadcast by hand, the sower walking up the marks. It was covered by casting with a spade, the soil being taken from the marks, producing depressions which became alleys, into which the litter off the beds was raked.

It is quite an art to cast so as to deposit just enough soil evenly all



over the bed; of course half the bed was covered at each cast. The first sowings were usually of the Long Red variety (fig. 488), which is hardier and comes on more quickly than the Turnip variety, this latter being sown after a sowing or two of the Long variety.

The growing of littered Radishes has been spoken of as a thing of the past, because at one time it was so general, especially near London, and now one hardly ever sees it. Individual growers in specially favourable situations may continue the practice. Probably the growth of

Radishes as a catch crop in cold houses used for Tomato culture has done a good deal to render littered Radishes unprofitable, and perhaps the driving of market gardeners farther away from the markets, and the consequent added difficulty of getting the litter, has done the rest.

Radishes are still grown in beds as described above, particularly for the earliest sowings, which can be commenced in March if the weather is favourable, choice being made of the warmest and most sheltered spot available. Later sowings are now usually made either broadcast with the fiddle or in drills. It takes 3 to 4 bus. of seed to sow an acre.

The labour of bird scaring can be considerably minimized by dressing the seed a few days before sowing with red-lead powder and paraffin. If the red lead is shaken over the seed on the barn floor, and then paraffin sprinkled over it, and, after, all turned once or twice with a shovel, every seed will be found to be coated with red lead. If

left for two or three days it will dry. A few pounds of red lead and  $\frac{1}{2}$  pt. of paraffin will do more than 1 bus. of seed.

Many sow *Wood's Frame*, which is a modified form of the old Long Radish, for the first sowing; then mixed Turnip in the proportion of one white to five red. The white-tipped variety called *French Breakfast* can be sown about the middle of March. This matures very rapidly, and requires great watchfulness to get it to market before it becomes "pithy". Sowings of Radishes can be made regularly up to the end of June, suspended during July and August, recommenced in September, when two more sowings may be made.

Radishes are sent to market in the form of bunches. Binding them



Fig. 488.—Radish—"Long Red"





RADISHES AT COVENT GARDEN MARKET

Showing Costermongers buying



Photos. W. J. Vasey

RHUBARB, ONIONS, AND BAGS OF CARROTS AT COVENT GARDEN MARKET





costs 1*d.* per dozen bunches for the Long ones, which are tied in fan-shaped "hands"; and 2*d.* per dozen bunches for the Turnip-shaped, which are bound in round bunches with osier rods. The "hands" and bunches are washed with soft brushes, rinsed in clean water, and packed for market. The price is 5*d.* to 10*d.* per dozen bunches for the Long and from 5*d.* to 1*s.* 3*d.* per dozen bunches for the Turnip. A good crop is from 1000 to 1500 dozen bunches to the acre.

Although the margin of profit over expenses per dozen is very small, Radishes can be made to pay if the grower is willing to give the necessary constant attention to securing a continuous supply. He may make up his mind to having to plough a sowing or two in during the season; but then if he keeps on he may, as a compensation, come in with a sowing or two when Radishes are scarce and the price runs up to a figure that gives the salesman genuine pleasure.

Some growers boast that they have taken five crops of Radishes off the same ground during one season. To use a colloquial expression, it need not be said that "this wants doing". It is fairly certain that the man who just now and then puts in a crop of Radishes, and either lacks the organizing



Fig. 489.—Radish—"French Breakfast"

power or begrudges the persistent attention necessary to keep up a regular supply, will not get much profit out of them. [W. G. L.]

Radishes in Worcestershire are sown on warm and sheltered borders for the earliest crops and in open breadths for the main crop. Care is always taken to sow them on rich soil, without which there cannot be quick growth and juicy, tender radishes. The earliest crops are sown in December on borders sloping to the south, the varieties being almost exclusively the mixed white and red turnip-rooted and Wood's Early Frame Radish. The borders are—as far as practicable—sheltered from the north by any means available. Often the screen consists of 7-in. or 9-in.-by-1-in. boards placed on edge and nailed or screwed to posts fixed in the ground and about 3 ft. high; in other cases the shelter consists of a double row of stakes at about 1 ft. apart, with the old growth of Asparagus—which was cut down at the end of November—laid horizontally between them, thus forming a wall or screen which will, with care, last several seasons.

After the seed is sown and carefully raked-in in December or January,



the whole is covered with clean straw. When the seed has germinated, and the seedlings appear above the soil, this protective covering of straw has to be carefully removed on favourable days by means of a very long-handled rake, to be again returned over the seedling Radishes before daylight fails; since, if they are not exposed to *light* they will perish, and if they be exposed to *frost* they will likewise perish.

Later crops are sometimes covered with straw, but more frequently they are left uncovered, and birds are scared away by means of lengths of string on which are fastened old tins containing several loose stones, bells, pieces of glass, &c. The string is kept several feet above the ground by means of strong forked sticks. A boy is stationed at one end, and is sometimes armed with a noisy rattle, and it is his duty to keep the birds at a distance by scaring them with his rattle, by emitting such vocal sounds of a hideous nature as he is capable of making, and by frequently pulling the string bearing the other noise-making instruments. So that when he is simultaneously halloaing, using his rattle, and pulling the string he creates a noise that only a bird stone-deaf could bear without fright. [J. U.]

**Radishes under Glass.**—Some modern market gardeners who have large unheated glasshouses utilize them during the winter and spring months for the production of early Radishes. One of the largest growers in this way is the firm of Messrs. Smith, of Feltham and Isleworth, Middlesex. In the latter district twenty-one large glasshouses, covering about  $10\frac{1}{2}$  ac. of ground, are put down in Radishes after a crop of Tomatoes. From 36 to 40 lb. of seed is necessary to sow 1 ac. of ground, and about 20,000 to 30,000 bunches of Radishes constitute the crop to the acre. The seed is generally sown about January and February, and Radishes are fit to pull by the second or third week in March, and continue till the end of April or early in May, when the ground is wanted for the summer Tomato crop. Radishes grown in this way realize about 1s. or 1s. 3d. per dozen bunches. [J. W.]

## § 27. RHUBARB

Probably with regard to no other crop that is grown by the market gardener does the treatment vary so much according to locality as in the case of Rhubarb (*Rheum hybridum*). In some places, particularly London, there is a considerable demand for the natural product, or green Rhubarb as some call it; in others, the only demand there is is restricted to the yellow-leaved forced product.

In some districts the stools are lifted, placed in sheds erected for the purpose, and heated either with flues or hot water and there forced; in others, manure is heaped around the crowns, which are covered with pots.

In some districts the crop is grown solely for forcing, and none is pulled as natural; in others, the principal crop is the natural, and only the worn-out crowns are forced.

The Rhubarb is a gross feeder, and responds especially to manures of

a nitrogenous character. Its strong roots, forcing themselves into the soil, have a dynamic effect which is appreciated by after crops. Rhubarb will do in a wide range of soil characters, provided water does not stand, and it is well fed.

The method of planting is to cut sets from old stools. A set is one good eye or two weak ones. They are planted in holes opened 2 ft. 6 in. by 2 ft. 6 in. apart, and the soil pressed well round the set. The time of planting is from December to March. If the Rhubarb is planted for forcing it is left till the third or fourth year, then lifted, or forced in situ. If grown naturally it is not pulled at all the first year after planting, only a little the second year, and the third and subsequent years' pullings last until the middle of June, when the crowns must be allowed liberty to store force by leaf action for next year's effort.

Natural Rhubarb is usually bunched in flat bunches formed on boards

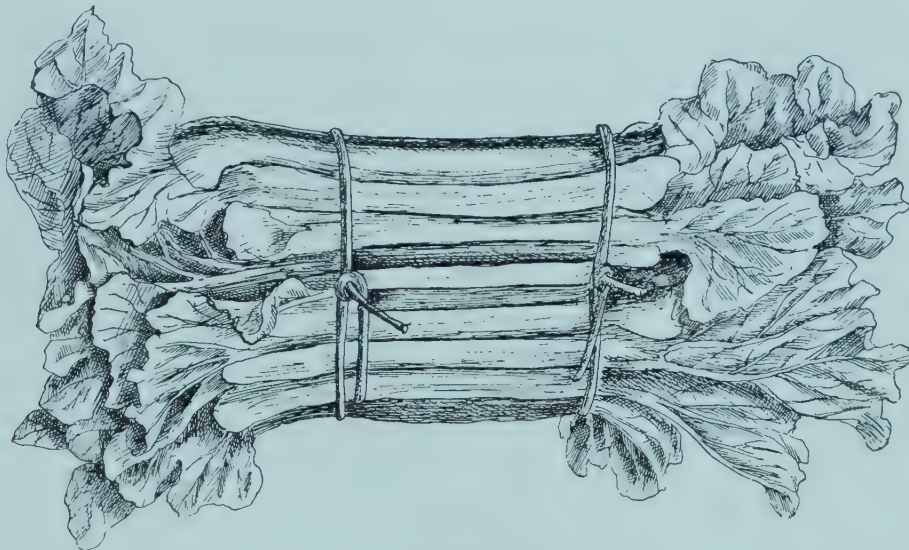


Fig. 490.—Showing Bunch of Late Rhubarb tied with Osier Rods

and bound with two rods, each secured by the method called "buttoning" (fig. 490). Pulling costs 2s. to 2s. 6d. per 100 dozen, trimming 2s. 6d. per 100 dozen, binding 15s. per 100 dozen, till the leaves need docking, and then an extra 2s. 6d. must be added.

The price realized varies from 4s. 6d. per dozen bunches at the commencement to 1s. per dozen bunches in the time of greatest supply.

Rhubarb is very heavy carriage, and this is a matter that a grower a long way from his market must take into consideration. For natural Rhubarb undoubtedly the best sort is the *Champagne*. Another good sort is *Davies' Champion*, but it will not stand the punishing that Champagne will. These varieties are red in appearance, maintain their colour all the season, and are red when cooked. For late work in June the *Victoria* is a useful sort; it produces enormous sticks of a fair colour when it is three years old, but it is green when cooked.

When grown for forcing only, the *Linnaeus* and the *Victoria* are most in favour, and *Johnston's St. Martin* has also advocates for this purpose.

**Forcing Rhubarb.**—Forcing takes from four to five weeks in a shed.





Fig. 491.—Clump of Forced Rhubarb

The heat to be maintained is 55° to 60° F. If the forcing is too sharp, a failure of colour is the result; if there is a check in growth, that is, if a higher temperature is started with than can be maintained, leaf is produced instead of stalk.

Plenty of water must be used during forcing. The Yorkshire forcers have set the fashion of little bundles of two or three sticks, which sell at 1s. 6d. to 2s. per dozen bundles early in the season. [W. G. L.]

## § 28. SEAKALE

The Seakale (*Crambe maritima*) of commerce has been evolved by selection from the maritime plant that can be seen growing on the seashore. It is useless for edible purposes unless artificially treated, by compelling it to grow in the dark and thus inducing it to expend its stored forces in sending out, in an effort to find the light, a compacted growth

which the darkness bleaches (fig. 492). The resulting product is an esculent with all the delicacy and with something of the flavour of the Asparagus, but at present nothing like so much in the public favour.



Fig. 492.—Forced Seakale

Seakale can be grown from seed sown in March, when it takes two years to form a mature "crown", or from "sets" obtained by cutting the roots into lengths of 3 to 4 in. and striking them, one end becoming the crown and the other the root. These sets are planted out in rows 15 in. apart with 10-in. spaces in the rows. The planters should be cautioned to close the sets well at the bottom with the dibber.

A great many shoots will be sent up from each set; many of these will disappear naturally; but in some cases three or four will persist, and as one good crown is better

than two or three medium or small ones, the crop should be gone over in the early days of July and "suckered" to single crowns.

Seakale prefers light sandy land. Though fond of moisture, it will not do where the drainage is not good. Being a Crucifer, it is terribly subject to clubroot attack. The appearance of this disease is often the indication that water is held in the land and has soured it.

Salt, potash, and phosphates are the most valuable manures for Seakale. Lime must be freely used to counteract the conditions that favour clubroot.

**Forced Seakale.**—Seakale is grown for forcing and as natural. For the former, the sets planted as above described are fit for lifting as soon as the foliage has died back in the autumn. The crowns are then taken up, the larger roots broken off to make sets for next year, and the crowns thus trimmed are laid either in sheds such as Rhubarb is forced in, or in beds under which hot-water pipes are laid, or around which manure is stacked. The heat given should be gentle and not too fierce. To get good results the process of forcing should take four weeks. Covering of mats and litter, supported by wooden framework and flaps, must be provided to ensure darkness and exclusion of air. When the growth is 8 to 9 in. long it is fit to cut. It is then sorted into best and seconds, and the most approved way of preparing for market is to tie it up in chip punnets each containing about 3 lb. weight, wrapping in blue paper for the best and white for the seconds. When it is plentiful it is sometimes sent up in half-sieves containing 12 lb. each.

Seakale is very tender and easily spoiled by frost, so that great care must be taken in handling and packing it during severe weather. The packing shed must be warmed, and plenty of newspaper and rough hay or straw used in the packing.

The price of seakale has come down very much of recent years. The average, which used to be 18s. per dozen punnets of best, is now under 12s. This means that all the processes in the production must be carefully scrutinized to save expenses if the result is not to be a loss to the grower. The expenses of cultivation may be set down as—

Sets, to cut and lay in, 6*d.* to 7*d.* per bushel; number of bushels required for an acre, 24.

Planting, per acre, 27s. to 30s.

Hoeing for the summer, £4 per acre.

Suckering, 10s. per acre.

Digging or ploughing out, 4*d.* per pole the first and 42s. per acre the second.

Picking up and carting in, 20s. to 25s. per acre.

Breaking off sets and laying in the crowns, about 60s. per acre.

This in addition to the preparations for planting, which will be on the ordinary scale and should include subsoiling. The cutting and packing will cost about 1s. per dozen for labour and 4*d.* per dozen for punnets,



paper, and straw packing. An acre of well-grown, well-forced Seakale will produce about 80 dozen punnets, of which 70 dozen should be best.

**Natural Seakale.**—For “natural”, Seakale is planted two rows 12 in. apart, with 12-in. spaces in the rows, and then alleys 3 ft. 6 in. in width. Down these alleys a crop of Lettuce can be planted in the summer, or a row of Seakale can be grown to take up for forcing. The mould in the alley is put up on the rows of Seakale in January to the depth of 9 in.; the sides are kept nearly upright by “facing” them with the spade, and the top of the bed thus formed is levelled with the back of the spade. This operation will cost from £6 to £8 per acre. If the sides of the beds are not kept upright, and at least 6 in. of shoulder preserved outside each row of Seakale, the crowns will force their way through the sides of the beds, as the shortest way to get light and air, becoming blue and useless. If the beds are properly “landed” the Seakale will come up through the top, announcing its presence by first producing a crack in the surface and then showing the little pink tips of its leaves. It should then be cut by removing the mould from the side with a spade until the top of the root is visible.

The crown should then be cut by a sharp stroke of the spade in such a manner that about half an inch of the root comes with it. After all the Seakale has been cut the beds can be levelled down, the alleys cropped with Lettuce or other crop, and the Seakale left in for another year. The roots will each send up a prodigious number of crowns, which must be suckered to two or three, according to size.

One serious drawback to Natural Seakale is that it is almost impossible to keep it back. Nearly the whole crop will come on to the market in a few days, so that there is a glut and it is unsaleable. This is particularly so in a late spring, when it clashes with the commencement of Asparagus. It is not an uncommon thing for Natural Seakale to drop from 5s. per half-sieve or half-bushel to 1s. 6d. or even 1s. in one day.

Natural Seakale is sometimes put up in punnets in the same manner as forced, but more frequently in half-sieves containing 14 lb. The price fluctuates so violently that no average can be arrived at. An acre of good crop will produce about 200 half-sieves. [W. G. L.]

## § 29. SHALLOT

The Shallot (*Allium ascalonicum*) is a native of Ascalon in Palestine. It is closely related to the Onion, but is milder in flavour. The true Shallot, which has rather long grey-skinned bulbs, is rarely seen. Its place has been usurped by the Jersey or Russian variety, which has coppery-red-skinned bulbs, somewhat irregular in shape. Shallots are usually raised from the cloves or offsets of the parent bulbs, but they may be raised from seed in the same way as Onions. The cloves are planted about February, in rows 9 in. to 1 ft. apart, and from 6 to 9 in. in the rows, and are left

half-exposed. There is an old saying that Shallots should be planted on the shortest day and harvested on the longest day, and no doubt this can be done in the milder parts of the kingdom. In good rich soil, kept clean by hoeing, excellent crops may be secured—from 25 to 30 tons per acre, although 15 tons would be perhaps nearer the usual yield. Even this at £10 per ton is by no means to be despised if a sale can be found for the bulbs.

### § 30. SPINACH

Spinach (*Spinacia oleracea*) is divided into winter and spring varieties. There is also a kind called New Zealand, which is grown for midsummer. It belongs to a different genus (see below). To take the winter variety first. This has prickly seed.

Sowings are made in late August and during September, in drills 9 in. apart, with the seed buried to the depth of  $1\frac{1}{2}$  in. It is a good plan to have the land on which the Spinach is to be sown ploughed a week or two before it is wanted, and left to settle, as it prefers firm ground. Pickings begin as soon as the leaf is big enough, and in mild seasons continue all the winter. Winter Spinach is liable to a fungoid disease the nature of which is hardly yet understood, and no remedy known for it, except perhaps sulphuring the



Fig. 493.—New Zealand Spinach (*Tetragona expansa*)

ground. When attacked, the plants go yellow at the leaves and gradually melt away. The earliest sowings are most frequently attacked, and it is a good precaution to put off one sowing to near the end of September. It is when spring growth commences that the winter Spinach produces its principal pickings, which continue until it runs to seed in June.

Sometimes, however, there is such a glut on the market that the bold cultivator prefers to plough it in early in May in order to get another crop on the land.

Spring Spinach consists of the round-seeded varieties, of which the *Victoria* is perhaps the most grown. Sowings commence early in the spring, and continue till June, after which it is no use sowing, because Spinach will not thrive during the hottest days of summer. [W. G. L.]

Spinach is grown in cold greenhouses during the winter and spring months when a large space is available. The seed is sown in October in drills about 1 ft. apart in the ordinary way. Growth is slow at first, owing to the low temperature, but picking commences about the middle of March and continues till May, when the ground is cleared for Toma-



toes. On warm, genial days the plants receive a good watering, and the ventilation is regulated according to the state of the outside weather. Women are chiefly engaged in picking the leaves, the cost being about  $2\frac{1}{2}d.$  per bushel, and 10 bus., each holding 18 lb. of Spinach, are picked in a day. Prices for early Spinach run high, being often as much as 6s. to 9s. per bushel. [J. W.]

**The New Zealand Spinach** (*Tetragona expansa*).—This is a succulent trailing plant, with thick ivy-like leaves. It is raised under glass from sowings made in March. It is potted into thumb pots, or pricked into trays and planted out in late May or early June in rows 3 ft. apart, with 2-ft. spaces in the rows. When once established it grows quickly and covers all the ground. The leaves are gathered for market. It revels in the hot weather, wants frequent waterings, and succumbs to the first frost. [W. G. L.]

### § 31. TOMATOES

Thirty-five years ago the Tomato (*Lycopersicum esculentum*) was practically unknown as a marketable fruit in the British Islands. Here and there a market gardener would be found having a few plants as curiosities more than anything else. It gradually began to dawn upon growers, however, that as a money maker there were great possibilities in the cultivation of Tomatoes for market. At first gradually, then by leaps and bounds, space was devoted to the plant in the open air and under glass, and the fruits found an ever-increasing favour in the markets. As the industry developed it became necessary to erect special houses for the plants. At first these were small, perhaps 50 to 100 ft. long and 10 to 12 ft. wide, but it was found more economical on the whole to build longer and wider houses, and to use panes of glass as large as possible, to admit the maximum amount of light.

Some of the largest Tomato houses in the kingdom, perhaps in the world, are those of Messrs. A. W. & G. Smith, at Redlees, Isleworth. Here is a block of twenty-one huge glasshouses, arranged ridge-and-furrow fashion, and covering something over 10 ac. The largest house is nearly 800 ft. long and 32 ft. wide. The houses are continuous one with the other, stout brick piers supporting the guttering between them. There is a door at each end, and ventilators on each side along the top, and also somewhat lower than midway down the slopes. The sashbars are about 2 ft. apart, and the glass used is 21 oz., 24 by 18 in., thus giving plenty of light at all times. The rainwater—about 25,000 tons or 5,600,000 gal. annually—is not saved, but is allowed to waste at each end of the long range of houses—and do a certain amount of mischief to the brickwork. Water, however, is laid on from the main, and is distributed by means of hose pipes attached to standpipes placed at regular intervals at the side of the central pathway. In these houses there are ten plants in a row, one on each side of the pathway, and about 2 ft. is allowed between the rows. The plants are thus about 2 ft. by  $1\frac{1}{2}$  ft.

apart, and each house holds from 5000 to 6000 plants. They are usually planted in April after a crop of Radishes, Spinach, or Winter Cabbages have been taken off, and by the end of September the crop is practically finished, about six months elapsing between the first planting and final picking. Taking an average of 4 lb. of tomatoes to each plant, this range of twenty-one houses would yield something like 420,000 lb. (over 187 tons) of fruit during the six months. At £18 per ton—just under 2*d.* per pound—this would mean a gross return of £3366 for 10 ac. of ground, and at least one-fourth of this—£840—may be regarded as net profit, the rest going in rent, labour, rates, interest on capital, manures, &c.

This establishment at Isleworth is only one of thousands now devoted to the cultivation of tomatoes for market. There seems to be no falling off in the popular taste, and although prices are now much lower than they were a few years ago, it is evident that a capable grower is not likely to lose anything by growing tomatoes properly, even when he has to meet the competition of imported supplies. That these are by no means small may be seen from the following figures taken from the Returns issued by the Board of Agriculture:—

## TOMATOES IMPORTED

	1906.	1907.	1908.	1911.
	cwt.	cwt.	cwt.	cwt.
January ...	61,940	56,022	73,409	49,734
February ...	58,187	58,289	69,350	59,432
March ...	106,458	98,028	86,928	87,558
April ...	103,273	109,057	74,917	85,613
May ...	67,933	114,041	88,901	171,468
June ...	62,906	144,379	127,793	143,581
July ...	238,362	150,907	171,978	216,021
August ...	180,046	102,600	124,757	199,408
September ...	114,860	101,198	119,224	155,450
October ...	52,678	67,860	75,722	57,475
November ...	41,513	66,622	74,292	73,656
December ...	36,316	66,591	73,012	62,968
	1,124,700	1,135,499	955,985	1,362,364
Value ...	£953,475	£1,020,805	£1,160,283	£1,125,252

These figures show that in four years 4,578,548 cwt. of tomatoes, estimated at £4,259,815, were imported and consumed. The greater bulk of these imported tomatoes comes from the Canary Islands (604,692 cwt.), the Channel Islands (223,800 cwt.), France (115,500 cwt.), Spain (169,000 cwt.), and Portugal (1700 cwt.). In the same period British market growers probably sent to market five or six times the quantity, say 28,000,000 to 30,000,000 cwt. of tomatoes, and they may be valued roughly at 2*s.* per cwt. It will thus be seen that Tomato growing is by no means a small industry, and according as the population increases so is the trade likely to maintain its present hold on the community at large.



**Tomatoes in the Channel Islands.**—In the Channel Islands (Guernsey and Jersey) Tomato growing for market is practised extensively. In Guernsey the plants are grown chiefly under glass, but in Jersey they are mostly grown in the open air. The climate is milder than in most parts of England or Scotland, but is no more favourable for Tomato growing in the open air than parts of Devonshire and Cornwall and the south and west of Ireland. Indeed it is a question if the mildness and humidity of the Channel Islands are not drawbacks instead of advantages to the cultivation of Tomatoes. Whether grown under glass in Guernsey, or in the open air in Jersey, the plants seem to fall an easy prey to fungoid diseases, and it is not unusual to see thousands of plants in Jersey simply putrid with disease, although they have been heavily sprayed two or three times with poisonous Bordeaux mixture.

In Guernsey Tomatoes are grown under glass in the same way as in England, either in large pots or planted out, and trained up by means of string or bamboo canes. Very little ventilation is given, most growers firmly believing that opening ventilators is equivalent to spreading the disease amongst the plants. There may be some truth in this now, as there must be millions of spores in the atmosphere as the result of bad cultivation in former years. It is nevertheless bad for the Tomatoes to plant them so close together and to keep the houses so badly ventilated as they are in Guernsey. The tissues of the plants become so tender that the spores of the various diseases germinate upon them readily and cause havoc that often cannot be suppressed or prevented with all the nostrums so loudly recommended in some quarters.

Another fruitful cause, and perhaps the main cause, of the prevalence of Tomato diseases in the Channel Islands, is the enormous quantities of chemical manures or fertilizers used by many growers. Instead of cultivating the soil deeply, and ringing the changes upon layer after layer to a good depth, the soil is drenched with some chemical manure, and when that does not produce speedy and miraculous results, another brand is tried with similar results. Hence the cost of cultivating Tomatoes in the Channel Islands is usually much greater than in English establishments. The houses are built much more strongly than in England, and much valuable light is excluded by having narrow panes of glass, and huge division rafters about 5 or 6 ft. from each other. These are said to be necessary to give the houses strength against the gales, but it is questionable whether the grower is not more or less at the mercy of the island carpenter.

In Jersey there are few glass establishments devoted to Tomatoes. The largest is that of Messrs. Bashford, at St. Saviours. In one house, 777 ft. long and 32 ft. wide (over  $\frac{1}{2}$  ac. in extent), about 12 tons of tomatoes are produced annually. From Christmas till October in one season the houses are occupied with Tomatoes. The next crop is Potatoes from October till March and April, and these are followed again by Tomatoes, with a row of Runner Beans after every third row. With

such rotations as Potatoes and Tomatoes, which are practically similar in their nature, in their likes and dislikes, and in the fungoid diseases that attack them, it would not be wonderful to find the diseases left behind by one crop playing havoc with the next.

So far as the outdoor culture of Tomatoes in Jersey is concerned, plenty of space is given to the plants. The rows are usually 3 ft. apart, the plants being 15 to 18 in. apart in the rows. Each one is tied to a bamboo stake, and as a rule about three bunches of fruit are allowed to mature upon each plant. From 9000 to 10,000 plants are thus grown to the acre, although in many cases there are probably 12,000 to 13,000 plants in the same space. Allowing for disease and failures, 15,000 lb. of fruit per acre would be a fair estimate, and reckoning these at 1*d.* per pound, the yield per acre would be something over £62 per acre, about half of which would be clear profit. More could certainly be realized if the soil were better and more deeply cultivated, and if the weeds were kept down by frequent hoeing. What expense is at present saved by *not* performing these very necessary cultural operations is more than counterbalanced by the cost of the Bordeaux mixture that is sprayed so lavishly over the crops, making the plants unsightly and the fruits at least risky to consumers. [J. W.]

Tomatoes must be considered as a special crop in and around the Vale of Evesham, where they are grown in the open air and without shelter of any kind except what may be derived from the adjacent fruit trees. The market gardeners commenced to give this crop their attention rather more than twenty years ago, since when it has extended to 250 or 300 ac. In 1908 one man alone grew about 30 ac. of Tomatoes—a risk which some men would not care to take. They go to supply the English, Welsh, and Scottish markets with cheap tomatoes during the months of September and October especially; and if the grower can obtain a net price of five, six, or seven farthings per pound he is amply repaid by a good crop. “Glass” is conspicuous by its absence from such an important commercial horticultural centre, the only place possessing any appreciable quantity being the “French Garden”, owned by Mr. J. N. Harvey.

The few gardeners who have one or two small and warm greenhouses supply their neighbours with young Tomato plants at a cheap rate per thousand during the latter half of May. These are planted usually in the warmest positions available, in rows about 4 ft. apart and 30 in. or 3 ft. apart in the rows, and tied and trained to a stick or small bamboo cane left about 3 ft. above the ground. As previously stated, one man has grown 30 ac. of Tomatoes; but usually the area devoted to them by individual growers varies from  $\frac{1}{2}$  ac. to 4 ac.

Considerable attention is paid to this crop in the matter of watering, tying, and pinching out the side shoots during the chief period of growth; and in August and September a part of the foliage is removed for the purpose of hastening the ripening of the fruit. An important item in the details of cultivation of this crop in the open ground is to have sturdy



plants *at, or very near,* the fruiting condition at the time of planting at the end of May or very early in June. If a bunch of fruit be "set" on each plant at this time, failure is as far removed as it can possibly be under this system. [J. U.]

**Cultivation.**—The Tomato is not a difficult plant to grow. It will flourish in any good garden soil that is sweet and clean, and contains a fair amount of well-decayed organic material. It is a mistake to have the soil too rich for Tomatoes either in the open air or under glass, as this induces them to develop gross sappy shoots and comparatively little blossom. A sandy loam will give the best results as a general rule. Indeed, the finest crop of Tomatoes I ever saw were grown in a mixture of old potting soil and sifted ashes, which formed the stage in a long greenhouse. From twelve to twenty-four fruits were borne on each truss, each fruit weighing from 3 to 4 oz.—just about the best weight for market purposes.

**Sowing the Seed.**—Perhaps the most convenient method of raising Tomato plants for market work is to sow the seeds in shallow wooden trays—those generally used for cuttings, and measuring about 15 in. long, 9 in. wide, and 2 in. deep. A little rough fibre and half-decayed leaves should be spread over the bottom for drainage and to prevent the finer soil falling through the slit in the bottom. The com-



Fig. 494.—Seedling Tomato Plant

post used should be a sandy loam and leaf mould. It should be pressed into the boxes firmly with the fingers to within  $\frac{1}{2}$  in. of the top. After levelling with a piece of flat board, the seeds should be sown carefully at least 1 in. apart every way, so that each box will hold about one hundred seeds. It is better to sow this way than haphazard, so that when germination takes place each little seedling will have plenty of air and light. The seeds should be covered with about  $\frac{1}{4}$  in. of soil, which should be pressed down firmly, and levelled with the board. When as many seeds have been sown

as are necessary for any particular crop, the boxes should be well watered with a fine-rosed can, and then placed on shelves near the glass. If sowing takes place in January and February or March, the night temperature should not be allowed to fall below 60° F. at night, with a rise to 65° or 70° during the day. If the soil is kept moderately moist, the seeds soon germinate under these conditions, and by keeping them as close to the glass as possible the young plants remain short and sturdy. The less light they get, and the farther away from the glass, the weaker and more drawn they become, and never make such fine plants. Of course, seeds of Tomatoes may be sown in pots or pans of various sizes according to taste or convenience; but other conditions should be the same as described above. By sowing thinly, as described, the young plants need not be moved from the seed boxes or pots until about 3 or 4 in. in height, because they will have plenty of space to develop until then. If the grower has been foolish enough to sow thickly, he will either have to thin out soon after the first true leaves have developed, or he must move the seedlings earlier into small pots; otherwise he runs the risk of spoiling and weakening a large number of plants (fig. 494).

**Potting.**—The young plants, being strong and sturdy, and growing steadily, will soon require more room than is available in the seed pans. Pots 3 in. across (or large 60's) may be used, and if a piece of rough fibrous loam is placed in the bottom, over a piece or two of crock, proper drainage will be secured. The soil should consist of sandy loam and leaf soil, or old soil shaken from the stools or roots of Chrysanthemums, Zonal Pelargoniums, &c., may be used if it has been exposed to the weather a few weeks or months beforehand. Early in the year it is better and safer to pot up the young Tomatoes in the house where they have been raised. A movable potting bench may be fixed up in a convenient spot, and the soil to be used should be warmed by placing a few hot bricks in it for a time if it is to be used at once. Cold or half-frozen soil from outside should never be used for potting Tomatoes or any other plants raised in warmth. The temperature of the soil, therefore, should be as near that of the greenhouse as possible, to prevent the tender young plants getting a serious check.

When potting young Tomatoes the soil should be pressed about the roots moderately firm with the fingers. Each plant should be placed in the centre of the pot (although some growers prefer placing them at one side), and the stem may be sunk down to the seed leaves, or within  $\frac{1}{2}$  in. of the first true leaf if the seed leaves have withered. After potting, the soil should be given a good watering with a fine-rosed pot. The plants should then be placed on shelves near the glass or on stages where they will receive plenty of light. For the first two or three days after potting it may be necessary to shade the freshly potted plants from strong sunlight. This may be done by spreading sheets of newspaper over them, or by letting down blinds outside, if any. Once, however, the plants have "picked up", that is, have established themselves, they need plenty of sun-



light and as much air as possible on all days when the weather is genial. Watering must be attended to regularly each day, care being taken to give water only to those plants that require it. When the soil is still wet from the previous day's watering it indicates bad drainage or a plant that is unhealthy in its root and leaf action. All freshly potted plants should be watered with a rosed can until the soil becomes more consolidated; afterwards water may be applied carefully from a pot with a fine spout, so as not to make holes in the surface.

**Final Planting or Potting.**—Tomatoes are grown either in pots, wooden boxes, or planted out in beds or borders to develop and ripen their fruits. When the 4- or 5-in. pots into which they were moved from the seed boxes are well filled with roots, the plants will be ready for the final moving. If pots are to be used, 12-in. ones will not be too large. They should be well drained with a large "stopper" and a handful of "corks" at the bottom. Over these a thickish layer of fibrous loam, moss, or half-decayed leaves should be placed. The compost to be used should, if possible, consist of good fibrous loam, with a good sprinkling of river sand or grit and a little leaf mould, the whole compost heap being turned over three times before using, to secure proper mixing. If a dusting of basic-slag manure is added to the soil it will be found of great use to the plants when they are setting and ripening their fruits later on. About 1 lb. of basic slag will be sufficient to mix with an ordinary barrowload of soil. When using large pots for Tomatoes, the plants should be put in deeply without disturbing the ball of soil too much. The upper third of the large pots should not be filled with soil at first, as the space thus left will be useful for adding topdressings or mulchings of fresh soil later on to maintain the requisite growth and vigour of the plants.

Instead of using pots, many growers plant their Tomatoes in what are known as "kipper" boxes. These measure about 14 in. long, 8 to 9 in. broad, and about 4 in. deep, and cost about a penny each. They are very useful, and if placed on a bed of old soil or ashes, the roots of the plants push through the slits in the bottom and secure plenty of moisture from the old compost, as well as food that will have been left behind from other plants.

When neither pots nor boxes are used, the Tomatoes are then planted out one row each along sides of a narrow span-roofed house, or several rows in larger houses.

**Training.**—In small houses the main stems are trained up beneath the glass until they reach the ridge board; the top is then pinched out. All side shoots—"laterals" as they are called—are suppressed as they spring from the axils of the leaves. The sap is thus kept moving up the main stem from the roots into the leaves, where it is converted into flowering and fruiting material under the influence of sunlight. The more light the better; consequently it is a mistake to plant too closely, and about 18 in. should be left between the plants when trained up beneath the glass.

If several wires, about 1 ft. apart, have been tightly strained from end to end of the house, about 6 or 8 in. from the glass, it will be found a great

convenience. As the main stem reaches wire after wire, it should be tied with raffia, keeping the stem on the under side of the wire. There is always a natural inclination for the shoots to push against the glass. If allowed to do so, they often get scorched and deformed by the heat, what many gardeners call "basilheaded", whatever that means. In any case, the tops should be kept away from actual contact with the glass, and the layer of air between the leaves and the glass will temper the scorching rays of the sun in summer, and enable the leaves to carry on the work of assimilating food under more comfortable conditions. Many growers place a bamboo cane to each plant, and where this can be afforded it helps to keep the main stem in place when tied.

**Watering.**—When in full growth, Tomato plants require plenty of water at the root; the stems and leaves require none. The temperature of the water should never be lower than that of the house in which the plants are growing, and if a degree or two higher so much the better. The tanks should always be kept full, so that the chill may be taken off. In very large Tomato houses, where no tanks are used, but water is applied direct from the main by hose pipes, there is a certain amount of irregularity in watering that is difficult to avoid. Some plants get too much, others too little, and although the work is done more quickly, and more cheaply, the crops are by no means so large as when water is given properly to each individual plant. In giving water the main point to remember is to give sufficient each day, and neither too much nor too little. If the soil is soddened with water the roots become chilled, the leaves begin to curl, and the flower buds begin to drop, because the food they require from the roots is not forthcoming in sufficient quantity. On the other hand, unless a sufficient amount of water is given, the plants are unable to obtain their nourishment from the soil, and again the flowers and even the young fruits fall off.

**Defoliating.**—It is a common practice with market growers in all parts of the kingdom to mutilate the leaves of their Tomato plants, especially when the fruit begins to colour. There are very few indeed who allow the healthy leaves to carry on their natural work, but these few invariably get heavy crops of fruit. It is a popular fallacy that light is absolutely essential to develop the colour in the Tomato fruit. And yet every grower probably knows from experience that the brightest-coloured and most luscious fruits are often to be found beneath the leaves, completely hidden from the sun. They also know that the imported fruits are picked almost green, and that they colour in complete darkness in the hold of the ship during transit. Crocuses colour underground, and Grapes are shaded from strong sunshine by the vine foliage, and yet colour. And yet, notwithstanding these well-known facts, the great majority waste time and money in having work done that is more of a hindrance than a help to their plants. A reference to the work carried on by the leaves of plants (see Vol. I, p. 44) will convince anyone that so long as the leaves of a Tomato plant are clean, green, and healthy they



are performing the important work of feeding and ripening the fruits. When leaves, therefore, are cut away, or only partially cut away, as shown in the annexed drawings, the wounds caused have first of all to be healed up before the mutilated remains can proceed with their work of absorbing the carbon (which, apart from water, forms the great bulk of the plants and fruits) from the atmosphere.

The only leaves that should be removed are those that are turning yellow at the base, and those showing the slightest traces of fungoid



Fig. 495.—Common Example of Reckless and Injurious Defoliation



Fig. 496.—Tomato Plant, partially defoliated and injured

disease, and these should be burned immediately instead of being thrown on the rubbish heap.

**Ventilation.**—When Tomatoes are grown under glass it is essential to keep the atmosphere pure and fresh. This can only be done by proper ventilation. Houses properly built will have plenty of ventilators along the top, near the ridge board, those on one side alternating with those on the other. Ventilators will also be let into the sides; and in large houses there may be a second set about midway between the ridge and gutters. During the summer months all the ventilators may be open to their full extent. In this way there will be a good but not draughty circulation of fresh air, the movement of which carries the pollen from

flower to flower, thus ensuring better fertilization of the pistils. If houses are kept too close and "muggy" the air is not so pure and the plants do not set their fruits so well or grow so quickly; they are also more liable to fungoid disease. Early in the season, of course, when the plants are young and only just beginning to make growth, ventilation must be regulated with a good deal of care. Cold draughts must be avoided, and, if a little air is given to keep the atmosphere fresh, the ventilators on the side away from the wind should be opened, those on the windward side being kept closed. The mildness or otherwise of the weather is always the dominating factor in ventilating Tomato houses, and the grower who is himself sensitive to weather changes will always see that his plants are kept in a genial atmosphere.

**Manures.**—If the soil in which Tomatoes have been planted is a naturally rich and sandy loam, very little manuring will be required during the season beyond a mulching or topdressing of a similar compost, with a little well-decayed manure or leaf mould added to it. The remains of an old mushroom bed or old hotbed make an excellent topdressing, as the material keeps the roots moist, and at the same time yields up a certain amount of soluble food in the process of further decomposition. This is almost equivalent to giving repeated applications of weak liquid manure, and is perfectly safe. Liquid manure made from the droppings of cows, chickens, rabbits, sheep, &c., and given in a much-diluted state two or three times a week when the flowers are setting, will be of great assistance, but few market growers go to the trouble of making it.

When chemical manures are used they should be applied with care and judgment, and not recklessly, as one often sees. The chemical manures most generally recommended for Tomatoes are nitrate of soda, superphosphate of lime, kainit, and sulphate of iron. How to use these to the best advantage puzzles most growers, and the manures are often applied, as in the Channel Islands, on the "hit-or-miss" principle.

To apply chemical manures judiciously the grower must consider his particular soil and the appearance of his plants. Indeed the behaviour of the latter will be a very safe guide as a rule. If the foliage is large, luscious, and of a deep healthy green it may be concluded that the soil does not require any special nitrogenous manures like nitrate of soda or sulphate of ammonia. Leaves will only assume a fine healthy tint when there are already plenty of nitrates in the soil. If, however, the leaves are of a yellowish tint, and by no means luscious, it is a sure sign that nitrates are lacking in the soil. A pound, or at most 2 lb., of nitrate of soda or sulphate of ammonia may then be given to every square rod of soil ( $30\frac{1}{4}$  sq. yd.), taking care to spread it evenly over the surface, and having it watered in as soon as possible. Where these manures are not available, a good dressing of soot and a thin mulching of well-decayed manure will supply the necessary food in a perfectly safe form. If the plants do not respond readily to these manures, it may almost be taken for granted that the soil is also deficient in potash and phosphates—



both valuable foods (see Vol. I, pp. 156, 158). Phosphates may be applied by means of bone ash or bone meal at the rate of 4 or 5 lb. to the square rod; guano, 1 to 2 lb. to the rod; superphosphate of lime, 4 to 6 lb. to the rod; and basic slag, 4 lb. to the rod. The latter is an excellent phosphatic and lime manure, and should be mixed with the soil at the time of planting, as it is slow acting in its nature.

To secure a supply of potash, one of the cheapest manures is kainit. This, however, should not be applied to growing plants, as it contains so much common salt. It is best worked into the soil a few weeks before planting or potting takes place. The same remarks apply to muriate of potash, another highly concentrated potash manure. Sulphate of potash has come to the front of late years as an excellent manure, and when necessary may be given at the rate of 2 to 3 lb. to the square rod. Wood ashes, in addition to yielding up phosphates, are also valuable as a safe potash food, 1 ton containing as much as 150 to 200 lb. of potash. By burning vegetable refuse the grower can always have a supply of this manure at his disposal.

If a word of caution is necessary in regard to the use of chemical manures it may be given in regard to nitrate of soda. The frequent, and often unnecessary, use of this quickly soluble nitrate causes not only a softness and sappiness in the stems and leaves that predisposes them to attacks of fungoid diseases, but also engenders a softness and tenderness in the skin of the fruits that causes them often to crack and to travel badly to market.

**Winter Crops.**—The cultivation of Tomatoes as described above may be carried out in glasshouses without any artificial heat whatever during the summer months. If crops, however, are desired during the winter and early spring months, it will be necessary to have the houses heated, and a night temperature of not less than 60° F. must be maintained. For early autumn crops the seeds should be sown in the way already described, about the end of May and during June. No artificial heat will be necessary, and the plants may be grown on strong and sturdily with plenty of fresh air and light surrounding them. For early-spring crops seeds should be sown in September, the young plants being transferred to 2½-in. pots when large enough, and afterwards to 5-in. or 6-in. pots. In due course they should be placed in 10-in. or 12-in. pots, using a fairly gritty loam having a little leaf mould and basic slag mixed with it. By placing a slender bamboo stake to each plant the main stem can be tied from time to time as it grows, and all the laterals should be pinched out when they can be easily taken between finger and thumb.

As there is always more difficulty in setting the fruits of winter Tomatoes, care should be taken to keep the atmosphere pure and in a moving or buoyant condition on all days when the weather is mild and genial. If the stems are tied to wires or strings the latter may be strummed at intervals with the fingers at noonday for several days.

This will jerk the plants gently and cause the pollen when ripe to blow about and settle on the pin-like stigmas of the ovaries. A still safer and better plan is to tie a piece of fur or a rabbit's tail on the end of a stick and pass it over the flower trusses day after day when the sun is shining. This secures proper distribution of pollen, and eventual fertilization. It will more than pay for the time and trouble spent, by the fine crop of fruit later on. The illustration (fig. 497) shows a crop of "Winter Beauty" grown in pots in winter.

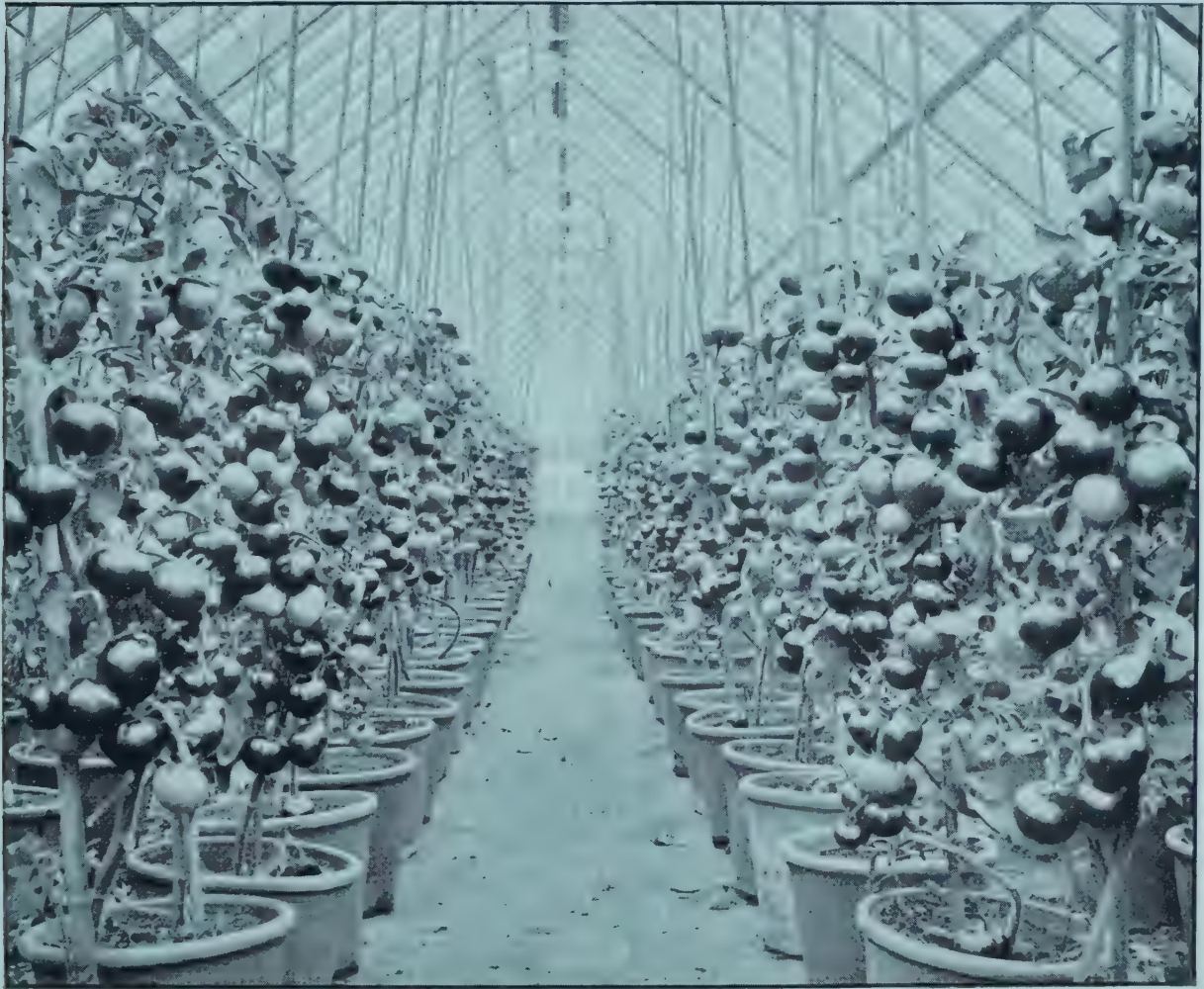


Fig. 497.—Tomato—"Winter Beauty". (Pot-grown plants.)

To make sure of success, attention must be paid to keeping the temperature equable, about  $60^{\circ}$  at night and  $65^{\circ}$  to  $70^{\circ}$  F. by day. It will be almost fatal to allow the temperature to jump up and down with great fluctuations. Good stoking is therefore a necessity during the winter months.

The next point is to give water carefully, which means only when the soil is getting dry. The atmosphere should not be too moist, indeed it should be on the dry side; and if the plants are not placed too close together all the available sunlight will be utilized to the best advantage.

**Outdoor Tomatoes.**—Except in such places as the Channel Islands, Devonshire and Cornwall, and the milder parts of Ireland, the cultiva-



tion of Tomatoes in the open air is attended with a certain amount of risk. The method of growing in Jersey has been already referred to at p. 166. Generally speaking, Tomatoes are a paying crop in the open air in hot summers, but are scarcely worth the trouble in most parts of the kingdom in cold, cheerless, and rainy seasons.

To ensure a fair measure of success the seeds should be sown under glass in March, and the young plants should be grown on as quickly as possible in 5-in. pots, and should be well hardened off, so that by the end of May, or early in June, they will be ready for the open air. The ball of soil round the roots should not be disturbed more than necessary, and if the stem is sunk in the soil almost to the lowest leaf, new rootlets will soon develop from the buried portion of the stem. The plants should be about 18 in. apart in the rows, and these should be 3 ft. apart, or two rows of plants may be 18 in. apart every way, and then a pathway 3 ft. wide should be left between every two rows. This will allow space for tying and for using the hoe frequently on the surface soil. Wherever possible, the rows should run north and south, to secure the maximum amount of light for the leaves and heat for the soil. Each plant should have a bamboo stake about 4 ft. long placed to it at the time of planting. Such stakes will cost from 30s. to 35s. per 1000, but will last for several years with ordinary wear.

Owing to the shortness of the season, only three or four trusses of fruit are allowed to develop and ripen on the plants. Some growers allow two stems instead of one to develop, each one being topped when one or two trusses of fruit have set. It is doubtful if there is any advantage to be gained in this way, as at least one, and probably two trusses of flowers have set on the single stem while the double one is only in the process of development.

Cultivation during the season should consist of a good hoeing at least once a fortnight to crumble the surface soil, to keep down weeds and insect pests, to liberate fresh food, to absorb dews, and, above all, in hot seasons to check evaporation of moisture from the soil. Treated in this way the Tomato plants will grow vigorously and fruit well, and will in all probability be quite free from fungoid diseases if the stock has been raised from healthy seed. In the event of disease appearing, any affected plants should be taken up immediately and burned, and the space in which they stood should be well dusted with flowers of sulphur or watered with a solution of sulphate of copper. It would not be worth while replanting.

The profits to be obtained in good seasons from an acre of outdoor Tomatoes are worth working for. Taking 9000 plants to an acre—and that is quite sufficient—there ought to be no great difficulty in obtaining an average of 3 lb. of fruit from each plant if they are cultivated and not allowed to grow anyhow. This would give a yield of 27,000 lb. to the acre. At 1*d.* per pound the gross return would be £112, 10s. Allowing £10 for labour, £25 for commission, &c., and £5 for rent and rates, there

would be a net profit of £72, 10s. for the four months the plants were being grown. Even if another £20 is deducted from this for raising and early cultivation, there is still a substantial profit of £52 10s. for the grower. However, in most parts of the kingdom this can only be expected about once or twice in five years for outdoor Tomatoes.

**Packing Tomatoes for Market.**—Tomatoes are packed in various ways for market. Around London these fruits are put up in half-bushel baskets holding about 20 lb. each, and are graded into firsts and seconds, and often into “smalls” or “thirds”. In the Channel Islands small handle baskets (fig. 498) holding 12 lb. are made up, the fruit being covered with paper and tied down. Enormous quantities are shipped to the London and provincial markets during the season, the prices returned to the growers varying from  $1\frac{1}{2}d.$  to  $3d.$  or  $4d.$  per pound less commission and charges for empties, &c., which often come to as much as 20 per cent. When the prices are low the growers therefore receive but little benefit for their labour.



Fig. 498.—Tomatoes in Handle Basket

**Saving Tomato Seed.**—Many, if not most, growers like to save their own seed, especially when they happen to have a variety that seems to suit them particularly well. Whether it is better to save seed from early fruits or from those at the tail end of the crop may or may not be a matter of importance, but it may conceivably affect the future crops. Following natural laws, it would appear to be better to select for seed the finest fruits that first ripen in the summer, not only because they *are* the first, and consequently earliest, but also because they have been produced with the first rush of youth and vigour and their seeds are more likely to have a fine, free, and disease-resisting constitution. The older a plant gets, the more feeble it becomes, the slower it ripens its fruits, and it falls an easier prey to disease. Seeds saved from such a plant may inherit some of the weaknesses of its parent, and consequently yield poorer returns to the grower. Hence it may be assumed that if seeds are to be saved it would be better in every way to obtain them from the first well-ripened fruits of the season.

It is by no means easy to clean Tomato seeds, as they are firmly embedded in the mucilaginous pulp that is so difficult to detach. One of the best means of obtaining clean Tomato seeds is to cut away the



outer rind and as much of the seedless pulp as possible. The remaining portion, full of seeds (there are from 100 to 300 seeds in each fruit), should be rubbed between the hands and afterwards placed in a vessel containing cold water. Hot or even lukewarm water should not be used, or the seeds may be caused to sprout. The liquid should be churned round and round with the hand or a stick. This will detach a certain amount of pulp, which can be skimmed off. The liquid may then be left for a few hours, at the end of which more pulp will be detached by churning, and can be removed. By repeating this operation on large quantities of seed and pulp, the latter is eventually separated from the former. The seeds should then be laid out on sheets of glass or tin or stiffish paper and allowed to dry. They should, however, be moved about with a knife blade occasionally to prevent them sticking to the surface. When thoroughly dry they may be rubbed between the hands with some silver sand and thus freed from all traces of dry mucilage.

Another method is to cut the fruits in half and then prick out the seeds with the point of a penknife on to a piece of glass, afterwards washing and drying as before. The pulp may be converted into jam.

**Diseases and Pests.**—The insect pests afflicting Tomatoes are not numerous, but some of them are exceedingly troublesome. Young plants are sometimes afflicted with Aphides and Ghost Flies, but these are easily checked by dipping or syringeing with a solution of quassia chip, soft soap, and nicotine (see pp. 216, 217, Vol. I.). Red Spider sometimes appears when the atmosphere is too dry, and is best kept down by gentle syringeing.

**Eelworms.**—These are often very troublesome to market growers. One kind (*Heterodora radicicola*) attacks the roots, causing large warty or pea-like swellings on them. The presence of these Eelworms is indicated by the leaves drooping and turning yellow, and the whole plant becoming limp sooner or later. As the young Eelworms are very small— $\frac{1}{75}$  in. in length—they can only be seen with the aid of a good pocket lens or microscope. They resemble minute eels, pointed at each end, and easily pierce the tissues of the tender roots. Wounds are caused on these, and with the exudation and coagulation of the sap the knotty swellings are produced. As the Eelworms suck and destroy the tissues the sap is unable to flow upwards to the leaves, hence the ultimate collapse of the plants. In due course the eggs of the pest hatch into tiny Eelworms, which pass into the soil, seeking the roots of other Tomato plants. They will, however, attack the roots of Cucumbers, Peas, Beans, Potatoes, Beets, Cabbage crops, Lettuces, and others, so that it would be dangerous to grow any of these crops after Tomatoes in the soil that is already infested.

Several remedies have been suggested, amongst them the following: (1) Saturate the soil three times, at intervals of a fortnight, with a solution of 1 part of carbolic acid in 20 parts of water. (2) Mix fresh gas lime thoroughly with the soil, which must then be left uncropped for at least six weeks. Quicklime may be used instead. (3) Water the soil thoroughly with lime water. (4) Water the soil with Little's Soluble Phenyle, 1 oz.

to 6 gal. of water. (5) Trench the ground, and mix with it 2 lb. basic slag and 12 oz. kainit to every square yard six weeks prior to planting. (6) Remove all the soil from the house and treat it outside; in the meantime thoroughly wash the house with a solution of 1 part of carbolic acid in 8 parts of water, or give the walls a good coating of freshly made lime-wash.

These remedies are more or less of the "hit-or-miss" type, and may or may not be successful or partly successful in destroying the pest. As a first precaution the injured plants should be taken up carefully and burned *immediately*. After the crop is over, it would be a laborious and costly task to take out all the soil and replace it with fresh material which might also contain Eelworms. Sterilizing the soil by steam or boiling water is perhaps the only effective remedy, and once done thoroughly there would probably be no further attack. In addition to this the soil should be turned up deeply—to a depth of 2 or 3 ft.—if possible, so as to bring the lower layers into cultivation, and give the upper and perhaps worn-out layer a rest for a season or two. Soil treated, or rather cultivated, in this way is not likely to be too rich or rank in organic material; and if it should be, that drawback can be easily rectified by adding either slaked lime or basic slag (2 oz. to the square yard) at the time of planting.

**Wireworms.**—These voracious pests are the larvæ of beetles known as Click Beetles and Skip Jacks. They are generally found in large numbers in freshly broken ground. It is therefore risky erecting green-houses on land that has been under pasture, or has not been cultivated for some years, until the ground has been well ploughed or dug and exposed to the air for one season at least. In this way the Wireworms will be exposed to their natural enemies—the starlings, blackbirds, thrushes, rooks, &c. These will destroy more in a day than any number of "traps" or insecticides will in a month.

When amongst Tomato plants, Wireworms will attack the roots and pierce the stems, causing the leaves to wilt badly. One of the commonest methods of catching Wireworms is to cut up pieces of carrot or beetroot into 1½- to 2-in. cubes, and insert them at the base of each plant just below the surface of the soil. The Wireworms are very fond of these juicy traps, and will be found boring into them. The pieces of carrot or beetroot should be examined every other day, and all Wireworms found should be destroyed.

Other remedies consist in dressing the soil, at least six weeks before planting, with fresh gas lime, or a week or two before with quicklime at the rate of about ½ bus. to a square rod. Kainit (about two-thirds of which is salt) may also be worked into the soil three or four weeks in advance, at the rate of 4 lb. to the square rod, to allow the salt time to work. Superphosphate of lime has also given good results. Sterilizing with steam or boiling water would be most effective when possible; in addition to which the soil should be deeply trenched.



**Fungoid Diseases of Tomatoes.**—There are several diseases of the Tomato caused by various fungi, the most dangerous being: (1) Leaf Spot, (2) Black Stripe, (3) Sleepy Disease, and (4) the Black Blotch or bacterial disease of the fruit.

The **Leaf Spot** or **Yellow Spot** is caused by a fungus known as *Cladosporium fulvum*. It forms brown mildew-like patches on the under surface of the leaves, and as the mycelium absorbs and destroys the interior tissues the upper surface is spotted with yellow owing to the destruction of the green colouring matter (chlorophyll) in the cells.

This disease is generally caused by a hot, moist, and stuffy atmosphere. Care should therefore be taken to maintain a proper and equable temperature, and regulate the ventilation without causing cold draughts or currents of air through the houses. In damp cheerless weather in spring or autumn the fires should be kept going, and no more water than is absolutely necessary should be given to the plants, so that the atmosphere may be kept in a fairly dry condition. Diseased plants are best taken out carefully and burned at once in the furnaces.

**Black Stripe** or **Black Rot** is caused by *Macrosporium Tomati*, also known as *M. Lycopersici* and *M. Solani*. The plants are attacked when in full growth. The stems begin to shrivel and discolour, with blackish stripes, the leaves to look sickly, blotched, and yellow, and then the fruits to turn black at the eye. The disease is probably due to sour or badly aerated soil, and perhaps too much organic manure. A hot and moist atmosphere are also predisposing causes. As preventives the soil should be deeply turned up and well dressed with freshly slaked or even unslaked lime at the rate of 1 lb. to the square yard, or about 2 tons to the acre, some time before planting. Overwatering should be avoided, and the atmosphere should be kept buoyant by proper regulation of the ventilators in fine weather.

**The Sleepy Disease of Tomatoes** is caused by the spores of *Fusarium Lycopersici* entering the roots of the plants from the soil. Its presence is indicated by the dull or yellowish colour and drooping of the leaves, and later on by a delicate mildew "bloom" on the base of the stems. These soon become patched with dull orange and signs of decay. If cut through near the base a brownish ring just beneath the bark will be noticed. Although the plants may be attacked when quite young, some weeks elapse before the presence of the disease manifests itself in the ways indicated.

All diseased plants should be taken up and burned immediately. It is useless spraying them with anything, as the disease is within the plants. The soil should be turned over and sweetened and well dressed with fresh lime. Too much organic manure should be avoided; and basic slag would be the safest artificial to apply to the crops generally, either under glass or in the open air. Proper ventilation should always be given, and the soil should never be drenched and sodden with water. It is better to water once a day properly than to make the soil sodden once a week.

The **Black Blotch** or bacterial disease attacks the ripening fruit of Tomatoes, although often earlier. It is said that the disease is caused by insects visiting the flowers and depositing the bacteria on the stigma. Insect visits to Tomato flowers are few and far between, and it is questionable if that is the right cause. It may be more likely to arise from mulchings or topdressings of stable manure often given to save watering. In any case the diseased fruits should be picked off when noticed, and burned. Spraying with insecticides, as often recommended, when the plants are in flower would do more harm than good, as the pollen would be wetted and thus prevented from being blown on to the stigmas to fertilize the young fruits. The safer plan would be keeping the ground clean by occasional hoeing or freshening up, plenty of air on all favourable days, proper watering, and shaking the plants at midday to distribute the pollen. It would be advisable also to dust the soil occasionally with flowers of sulphur.

**Market Varieties of Tomato.**—Growers for market insist upon tomatoes having a good rich crimson-red colour, roundish billiard-ball-like shape and size, free-cropping qualities, large trusses, and a skin that is not too tender and easily broken. There are many varieties of Tomatoes that will not come up to all these tests. Intelligent growers now take as much care in grading their Tomato fruits into various sizes—firsts, seconds, and thirds or “smalls” as a rule; but one or two exceptions to the general rule make as many as seven grades. Amongst the varieties useful for market work are: Balch’s Fillbasket, Chemin Rouge, Challenger, Hillside Comet, Ham Green Favourite, Holmes’s Supreme, Lister’s Prolific, Perfection, Stirling Castle, Sunrise (Carter’s), Tuckswood Favourite, Winter Beauty, The Comet, The Cropper, and Up-to-Date.

It should be mentioned that many growers prefer their own selection. Of the varieties mentioned above some prefer one, some the other. It is therefore impossible to say that one is in any way superior to the other.

[J. W.]

## § 32. TURNIPS

The Turnip has developed from a hardy British biennial (*Brassica Rapa*), and, with the Swede (*B. campestris Rutabaga*), constitutes a very important Cruciferous crop in all parts of the British Islands, from the Orkneys to Land’s End, in Great Britain, and from Donegal to Cork and Wexford, in Ireland. The French Turnips are descended from *B. Napus*, and are considered to be sweeter and better flavoured than the Common Turnip. According to the Returns of the Board of Agriculture and the Department of Technical Instruction, Ireland, there are in round figures about 1,800,000 ac. in the United Kingdom devoted to Turnips and Swedes, the last-named being, of course, more a farmer’s crop than a market gardener’s. The largest Turnip- and Swede-growing counties in England are: Yorkshire, 175,000 ac.; Norfolk, 110,000 ac.; Lincolnshire, 109,000 ac.; Hampshire, 54,000 ac.; Devon, 48,000 ac.; Suffolk, 44,000 ac.; Wilts,



36,000 ac.; Northumberland, 34,000 ac.; Salop, 32,000 ac.; and Dorset, 31,000 ac. There are several counties having over 20,000 ac. each, and many more with considerably over 10,000 ac. each. In Scotland, which has over 438,000 ac. under the crop, the largest Turnip-growing counties are: Aberdeen, 86,000 ac.; Forfar, 32,000 ac.; Perth, 26,000 ac.; Berwick, 25,000 ac.; Fife, 22,000 ac.; Banff, 21,000 ac.; and Roxburgh, 20,000 ac. There are a dozen other counties with 11,000 to 20,000 ac. each.

Ireland has about 280,000 ac. of Turnip land; in 1899 it had over 300,000 ac. The province of Leinster has over 91,000 ac.; Ulster, 89,000 ac.; Munster, 73,000 ac.; and Connaught, 24,000 ac. The greatest Turnip-growing counties are: Cork, 35,000 ac.; Wexford, 20,000 ac.; Tipperary, 18,000 ac.; Donegal and Down, each 17,000 ac.; Londonderry, 13,000 ac.; and Queen's County, 11,000 ac.

Wales is also well provided with Turnip fields, having a total area of nearly 58,000 ac. The county of Denbigh has 8000 ac.; Glamorgan and Montgomery, 6000 ac. each; followed by Anglesey, Pembroke, and Radnor, each with 5000 ac.

The average yield per acre is about 20 tons. That much better results than this could be attained there is no doubt, and as much as 36 tons per acre have been recorded. Something like 130,680 plants can be grown on an acre of ground. Taking a nice saleable-size turnip as weighing 8 oz., without the top, the yield would be just over 29 tons to the acre. It has been estimated that an acre of Turnips absorbs from the soil 201 lb. of potash, 107 lb. of lime, 79 lb. of sulphuric acid, 66 lb. of chlorine, 59 lb. of phosphoric acid, and 39 lb. of soda. The quantities of these foods will vary according to the weight of the crop, which will itself be influenced by good or bad culture. As a set-off against what is taken out of the soil, the tops, if not carted away, will supply from 6 to 10 tons of manurial material per acre, thus relieving the pressure on the ordinary manure bill. When it becomes necessary to apply manures for Turnips the nature of the soil must be considered. For stiffish land about 10 tons of stable manure, 4 cwt. of superphosphate,  $\frac{1}{2}$  cwt. of sulphate of ammonia, and 4 cwt. of kainit may be applied, the latter before the crop is sown and after the stable manure has been dug in. On light land about twice as much stable manure and kainit may be necessary.

Like other plants of the Brassica family the Turnip is subject to attack from the Clubroot Fungus (*Plasmodiophora brassicæ*). In soil that has been more or less heavily dunged, and not limed, this disease is prevalent, and is very difficult to eradicate. Notwithstanding the many highly boomed remedies, lime in some form or another appears to be the best and cheapest antidote. Badly infested soil should have about 1 bus. of lime to the rod (160 bus. to the acre) dug in during the winter. This will check any acidity caused by the decaying manure and moisture, and thus destroy the conditions suitable for the fungus. It may take four or five years to eradicate the pest, but half the quantity of lime only will be necessary after the first year.





TURNIPS FOR STREET SALE

Turnips badly infested with maggots of Gall Weevil. Notice the warty growths



FORCED RHUDARB FOR MARKET





Another troublesome and unsightly disease is that caused by the Cabbage Gall Weevil (*Ceutorrhynchus sullicollis*). This pest lays its eggs flush with the ground on the young "bulbs". In due course the young maggots are hatched out and penetrate the tissues, thus causing the sap to exude and form wart-like swellings. Inside these the little white maggot is perfectly safe, and cannot be reached by the most virulent insecticides. After several years of experimenting, the only sure remedy for this pest is prevention. The frequent use of the hoe in the early stages of the crop seems to keep the plants perfectly free from the pest. It appears that the movement of the soil against the plants detaches the newly hatched maggots from the stems, and, being thus deprived of their natural food, they soon die. The Plate shows a load of turnips to be badly infested with the Cabbage Gall Maggot. [J. W.]

The Spring Turnip may be called the crop of the market gardener, while that of the autumn and winter may be termed the farmer's crop. Spring Turnips want rich warm soil, well cultivated. There is an old tradition



Fig. 499.—Turnip—Early Snowball

among gardeners that the first sowing must not be made before the first full moon in March, or they will bolt. The earliest varieties are the strap-leaved *White- or Purple-topped Milan*. These, drilled in rows 1 ft. apart, and singled to 6 in., should come to market early in June. The *Early Snowball* (fig. 499) is a good sort for second sowing, followed by the *New Model*, which requires more room than the other two. By arranging the sowings at intervals of ten days or a fortnight a supply can be kept up till late July, when the market can be left to the farmer. Spring and summer turnips are not of first value unless they are clear and white in the skin. To obtain this the land must be freed from the grubs of the Turnip Beetle, which eat unsightly holes in the face of the turnips. For this purpose one of the several preparations that give off a gas



poisonous to insect life in the soil should be applied according to directions before the seed is sown. The Turnip Fly may be a trouble in a dry spring to the young seedlings. A good preventive against this destructive pest is to sow soot over the land as soon as the first seedlings appear above ground, and a second one as soon as the seed leaves are well developed. The sowings of soot should be made in early morning, while the leaves are damp, but not when there is a frost. [W. G. L.]

### § 33. VEGETABLE MARROW

The fruit of the Marrow (*Cucurbita Pepo ovifera*) is becoming more and more important as an article of food. As a forcing plant in the bush form it is very useful. Those who employ lights and boxes for raising Lettuces during the winter will find the Marrow a valuable crop with which to fill them during the spring months, particularly if there are pits with hot water under. If not, a bed of manure to give the plants a start, and night coverings of litter or mats will bring them on to fruit in June, a good time before anything can be on the market from those sown out-of-doors. If trailing Marrows are put under the lights, then the rows can be 4 yd. apart, and as soon as May is out the boxes can be lifted to allow the shoots to run out, and they will soon cover the ground. To grow Marrows successfully when planted on hot beds of manure, water must be handy, in quantities enough to keep them moist in any weather. In the evening after sunset is the time to get the best results from watering. If the Bush variety of Marrow is grown, then the white is the better for growing under lights.

The Green Bush Marrow is largely grown as a field crop. The seed is sown during May in rows 3 ft. 6 in. or 4 ft. apart. Two or three seeds are put in a place in case one or two should fail. The seeds are covered with  $\frac{1}{2}$  in. of soil, and are so arranged as to be 3 ft. apart in the rows. When once above ground it is astonishing how rapidly the plants grow. Where more than one seed has come up in a place they are singled, and no more attention is needed except hoeing. This can be done principally with the horse hoe unless the crop is "middled" with something else, which it may be, either with Lettuce or Spinach or three drills of Radishes, where the land is light and good enough. [W. G. L.]

So large an area as 200 to 250 ac. of Marrows in the Evesham district may appear an exaggeration, but probably the estimate is too low; there are so many who grow them, that if they averaged only  $\frac{1}{8}$  ac. each there would be a larger area accounted for than that mentioned.

Sometimes the Marrow plants are raised from seed sown in pots as described for Cucumbers; but more usually the seed is sown where the plants are to grow and fruit. In the latter case holes—as for ridge Cucumbers—are made at certain distances apart, the distances depending on whether the ordinary rambling plant be grown, or whether they be

“bush” Marrows; the latter being compact and very fruitful plants. The latter are usually planted about 5 ft. apart, but the former are given twice the space. The bush Marrows have almost displaced the rambling species. One or two forkfuls of manure is placed in each hole, the soil returned over it and forming a small mound, a ring of metal (usually zinc) about 12 in. in diameter and 3 or 4 in. in depth is placed thereon, three or four seeds are sown, and a disk of glass placed over the ring. This is done about the end of April. Some covering is applied nightly until danger from frost is past; and when the young plants appear above the soil the weaker ones are destroyed. With the warmer days and nights of June the glass is entirely removed, and the Marrow plants fully exposed. Marrows are usually sent to market in bushel hampers or “pots”, and are sold in that way; so that 2s., say, may be given for a “pot” containing twenty small marrows or ten medium-sized ones. [J. U.]



## SECTION XXXIII

### Sweet Herbs and Small Salads

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From a commercial point of view the cultivation of herbs has sunk to a low ebb amongst market gardeners. Some thirty or forty years ago, however, many kinds were grown in large quantities between the rows of fruit trees and bushes, and in odd parts of the gardens where other crops could not very well be grown. The decline in the industry is largely due, no doubt, to the large supplies that are now imported from more favourable climes than our own, and at very much lower prices. And there are a few places in which medicinal herbs are grown for the purposes of the big wholesale chemists, but these are scarcely market gardeners in the usual sense of the term. Thirty years ago there were upwards of 1000 ac. within 30 miles of London devoted to the cultivation of herbs, chiefly in the neighbourhood of Mitcham, but now there are very few. There are, however, still some kinds to be met with in large or small patches in various places, private gardens having a greater variety than what is to be found in commercial establishments.

**Angelica** (*Angelica Archangelica*).—This umbelliferous biennial or perennial grows upwards of 4 ft. high, and has large deeply-divided leaves and umbels of yellow flowers in roundish heads. It flourishes in rich, moist soil, and is raised from seeds sown in spring or when ripe in August. The seedlings are transplanted about 2 ft. apart each way, and the leaves are eaten raw or cooked for use with fish or flesh. The seeds are used for flavouring, and the spindle-shaped roots are employed medicinally.

**Balm** (*Melissa officinalis*).—A perennial Labiate about 1½ ft. high, native of South Europe. The young shoots are used for seasoning and salads, and also in the manufacture of liqueurs and scents, as well as for making decoctions for invalids. It grows in any garden soil in warm sunny spots.

**Basil, Sweet** (*Ocimum Basilicum*).—This East Indian annual grows about 1 ft. high. It is raised from seeds sown in gentle heat in March and April, the seedlings being transferred to the open ground at the end of May or early in June, 6 to 8 in. apart every way, in light rich soil. The highly aromatic ovate lance-shaped leaves are used for flavouring.

The shoots are cut before the flowers open and are tied in bunches to dry off for winter use. The Bush Basil (*O. minimum*) is a much dwarfer and more compact-growing plant with smaller leaves. It is raised and treated in the same way as the Sweet Basil.

**Borage** (*Borago officinalis*).—An annual herb of the Forget-me-not family, 1 to 1½ ft. high, with hairy stems and leaves, and blue, purplish, or white flowers. It grows in ordinary garden soil, and is raised from seeds sown in the open in March and April for summer and autumn use, and in frames in autumn for winter and spring use. It is used chiefly in connection with the preparation of claret-cup.



Fig. 500.—Sweet Basil. (t.)

**Burnet** (*Poterium Sanguisorba*).—This hardy British perennial grows 1 to 2 ft. high, and its pinnate leaves having a peculiar Cucumber flavour, are sometimes used as a salad and in soups. It grows in any garden soil, and may be raised from seeds and by division.

**Camomile or Chamomile** (*Anthemis nobilis*).—At one time many acres were devoted to the culture of Camomile in the Mitcham district, between rows of Lettuces and other fairly quick-growing crops. The plants, easily recognized by their finely-divided fern-like leaves and white Marguerite-like flower heads, flourish in any garden soil, and are easily increased by division of the roots in March. The flower heads are the chief crop. Before they open they are picked off and laid out in shady airy places to dry, after which they are packed in canvas or paper bags for sale.

**Caper Bush** (*Capparis spinosa*).—A South European wiry and spiny-stemmed shrub 3 to 5 ft. high, with roundish glistening leaves, and white flowers 2 in. across. It can only be grown in the mildest and warmest parts of Britain. There is also a form without spines. The flower buds, known as “Capers”, are gathered when as large as peas, and are pickled in vinegar.

This plant must not be confused with the “Caper Spurge” (*Euphorbia Lathyris*), a milky-juiced British biennial, 3 to 4 ft. high, with ovate-oblong blue-green leaves, and roundish fruits which are often taken for real “Capers”. The seeds yield an extremely acrid oil, resembling croton oil in its properties, and sometimes substituted for it. The plant is very common in some cottage gardens.

**Capsicum** (*Capsicum annuum*).—The well-known Chili Peppers are obtained from the seedpods of this plant, of which there are many varieties. In a green state the pods are used in pickles, salads, and for making Chili vinegar. When ripe, they are ground in a dried state to make Cayenne



Pepper. As decorative plants for the greenhouse they are mentioned in Vol. II, p. 145. Plants are raised from seed sown in heat in February and March, in a light rich compost. The seedlings are pricked out when 2 to 3 in. high into small pots, and are eventually fruited in 6- or 8-in. pots. They like abundance of light and air and fair supplies of water. When ripe, the pods are picked and stored away in a dry place, and will last for two or three years. In the most favoured parts of the kingdom, Capsicums may be ripened out of doors in summer.

**Caraway** (*Carum Carui*).—The seeds of this European biennial of the Umbellifer family are well known for their use in confectionery, per-

fumery, and flavouring. The plant has a fleshy carrot-like root, and grows 1 to 2 ft. high, having finely-divided leaves and umbels of small white flowers. The seeds are sown in March and April in shallow drills a foot apart; the seedlings are thinned out about 8 in. apart in due course, and the soil is kept free from weeds by occasional hoeing. The seeds ripen in July and August following the year of sowing.



Fig. 501.—Prickly Tours Cardoon

**Cardoon** (*Cynara Cardunculus*).—This perennial composite is a native of South Europe. It grows up to 6 ft. in height, and has large pinnate leaves, greyish-green above, almost white beneath. In some varieties there is a yellow or brown spine, often over  $\frac{1}{2}$  in. long, in the angle of

the leaf divisions. The fleshy leaf stalks when blanched, as well as the thick fleshy main roots, are the edible portions. The best-known varieties are the Prickly Tours (fig. 501), the Ivory White, the Spanish, and the Artichoke-leaved or Puvis. Of these the Prickly Tours is considered the most valuable, notwithstanding the wicked spines on its leaves, which necessitate great care in working among the plants.

Cardoons like a deeply trenched and well-manured soil. They are always raised from seeds. These are sown in heat in April to have plants for the open air by the end of May or early in June, the seedlings being potted up singly when large enough to handle. In the open air the plants are placed in holes or trenches about 1 ft. deep, and from 4 to 5 ft. apart. The space between the rows are utilized for quick-growing crops like Radishes, Early Carrots, Lettuces, Dwarf Beans, Spinach, &c., which are taken off before the blanching process begins.



Blanching takes place in autumn. The stems are carefully gathered together by winding string round them. Straw bands are then tied round them to exclude the light, or soil may be banked up round them as for Celery. To blanch the stems thoroughly it is necessary to exclude the light from them for at least three weeks. They are then cut just below

the surface of the ground, the withered leaves are detached, and the roots are trimmed up neatly.

**Chervil** (*Anthriscus Cerefolium*).—This South European annual is grown for its finely-divided leaves, which are used for flavouring soups, and for salads. The “curled” variety (fig. 502) has smaller foliage than the “plain” or common kind. Seeds are sown at intervals of a month or so from February to October, in shallow drills about 8 in.



Fig. 502.—Curled Chervil (*Anthriscus Cerefolium*)

apart, and cutting may commence six or eight weeks after sowing. Cool, partially shaded places are best for the summer sowings, and warm spots for the winter crops.

The “Bulbous-rooted Chervil” (*Chærophyllum bulbosum*) is a hairy biennial with stumpy carrot-like roots (fig. 503) and finely-divided leaves with violet stalks. The roots when boiled are very floury and have an



Fig. 503.—Bulbous-rooted Chervil (*Chærophyllum bulbosum*)

aromatic flavour. The seeds should be sown in rich soil in early autumn, not later than mid-October, and the roots will be ready for lifting the following July or August. Seeds may be also sown in spring, but as they have low vitality, they should be preserved between layers of sand or dryish soil during the winter months.

**Chicory.**—Of late years the Chicory (*Cichorium Intybus*) has become fairly well known, chiefly in the form of its blanched leaves,

which when forced in warm dark places are known as *Barbe de Capucin*. There are several varieties, one of the best being the large-rooted or Brussels Chicory, the forced roots of which produce what is known as “Witloof” or “White-leaf” (fig. 504). To obtain good roots the seeds should be sown in nicely prepared soil in April or May, in shallow drills about 1 ft. apart. The seedlings should be thinned out about 1 ft. apart, and



the ground should be kept free from weeds. From the end of October onwards the roots are lifted as required for forcing. The old leaves are removed and trimmed off within  $1\frac{1}{2}$  in. of the top of the roots. Any side roots are also suppressed. The main roots being shortened to 8 or 10 in.



Fig. 504.—Witloof  
Chicory

are placed in trenches or boxes which are filled with rich gritty soil, so that the tops of the roots are 8 or 10 in. below the surface. They are then placed in the forcing chamber, or may be covered with a layer of hot manure, about 1 ft. thick, to encourage rapid growth. In three or four weeks yellowish heads of excellent flavour are ready for cutting, but care must be taken to secure them before the tips of the leaves touch the manure over them.

**Chives** (*Allium Schænoprasum*).—This bulbous-rooted European perennial is grown for its slender fistular grass-like leaves, which are used in salads and soups, having a milder flavour than onions. It has clusters of pretty violet-red flowers, and flourishes in any good soil. Easily increased by division in March or April every second or third year.

**Clary** (*Salvia Sclarea*).—A woolly-haired biennial or perennial of the Labiate family, having broadly ovate grey-green wrinkled leaves, and tall spikes of white or lilac flowers. The leaves are used for seasoning soups, &c. The seed is sown in April in drills about 18 in.

apart, and the seedlings are thinned out about 1 ft. apart in the rows, or may be transplanted. A new plantation is made annually if necessary.

**Coriander** (*Coriandrum sativum*).—A hardy South European annual 2 ft. or more high, with divided leaves and umbels of small white flowers. The young leaves are said to be used for seasoning soups and salads, notwithstanding their strong flavour. The seeds are largely used in confectionery and the manufacture of liqueurs, &c. Plants are easily raised from seeds sown in rich soil in warm spots.

**Corn Salad or Lamb's Lettuce.**—This native hardy annual (*Valerianella olitoria*) makes a useful catch crop sown between rows of fruit trees, or in specially prepared beds. The kinds mostly favoured are the "Large-leaved", the "Improved dark-green or Cabbaging", and the "Italian". The seeds are sown broadcast or in drills about 6 to 9 in. apart, and are afterwards thinned out from 3 to 6 in. apart. Sowings may be made in March and April and again in August and September. The plants are pulled and marketed whole as soon as large enough, being washed and packed in peck or half-bushel baskets. Corn Salad is largely grown in French market gardens. (See p. 203.)

**Cress.**—This quick-growing Persian annual (*Lepidium sativum*) is highly valued for the pungent flavour of its young and tender leaves and stalks. Seeds are sown several times during the season under glass



on flat beds in nicely prepared fine soil, and are given a good watering, after which the beds are covered with mats. These are removed as soon as germination takes place, and when the stalks are about 2 in. high they are cut with a special knife in handfuls, and are deftly placed upright in chip punnets, in which they are sent to market.

Very often Mustard (or rather Rape) is grown with the Cress, in which case the latter, being slower in germination than the Mustard, is sown two or three days in advance. In this way both the Mustard and Cress arrive simultaneously at a fit state for cutting. The best prices are realized



Fig. 505.—Crate packed with Punnets of Mustard and Cress

from January to March and April (2s. to 4s. per dozen punnets), but the prices come down later on.

**Dandelion.**—Owing perhaps largely to our greater intercourse with continental nations the once much-despised Dandelion (*Taraxacum Dens-leonis*) is now a crop worthy of the attention of some market gardeners. Indeed it has been sent to market for many years past by one or two who developed a connection for it, although one cannot say that it has been “cultivated” as a crop in the ordinary sense of the term. The plants are allowed to grow just wherever they like, and when large enough for sale, are sliced off with the hoe, washed, and packed in baskets for market, where they realize from 9d. to 1s. 6d. per half-bushel, and sometimes more. The leaves, green or blanched, are appreciated as a salad. Besides the common variety, there are now one or two improved strains.

**Dill** (*Anethum graveolens*).—An umbelliferous fennel-like annual or



biennial, with leaves cut into thread-like segments, and having small yellow flowers. The leaves are used for flavouring, and the seeds are used as a condiment. The plants grow in any garden soil, and are raised from seeds sown in April, the seedlings being thinned out to about 8 in. apart in due course.

**Egg Plants or Aubergines.**—Of late years the fruits of the Aubergine or Egg Plant (*Solanum Melongena*) have found their way into British markets. Some of the fruits are white and resemble an egg in shape, but others are longer and more club-shaped, and of a deep violet-purple colour. One called "Violette de Tokio" is much favoured in French gardens. Seeds are sown from November onwards in rich gritty soil in a temperature of 70° to 75° F. The seedlings are pricked out 3 or 4 in. apart when large enough to handle easily, and are again transferred after three or four weeks to pots by themselves, or are planted in hot-beds over which 6 to 8 in. of sandy loam and leaf soil, or well-decayed manure, has been spread. Each plant is allowed about 2 to 2½ sq. ft. in the frames, and care is taken to protect them from frost at night. The tip of the main shoot is pinched out to secure a branching habit; when the four or five side shoots have grown sufficiently long, they also have the tips pinched out. All further growths are suppressed as they appear, and each plant is allowed to mature from ten to twelve fruits. The crop is finished in four or five months from the date of sowing. The fruits are served in various ways. "In Provence the fruit is cut longitudinally in two, and the seeds and spongy substance surrounding them are taken out. The two halves are then placed on the gridiron, with the cut faces upwards, and whilst roasting, the flesh is soaked with fine salad oil or fresh butter, applied a little at a time, a sufficiency of pepper and salt being added. Some augment the flavour with parsley, anise, or other aromatic herbs; others place an anchovy or a pilchard between the two pieces. The great



Fig. 506.—Florence or Fennocchio Fennel

difficulty in cooking is to avoid the flavour of smoke; with this object in view the fruit is sometimes cooked between two plates. Another mode of preparation consists in peeling the fruit, placing it in a frying-pan, scoring it across and across, filling the incisions with fine Florence oil, and then sprinkling with salt, pepper, nutmeg, and grated bread. When half-cooked, a little aromatic vinegar is poured over the fruit, which is then served garnished with parsley or chervil."—*The Gardener's Assistant*.

**Fennel** (*Fœniculum vulgare*).—This South European perennial grows about 5 ft. high, and is known by its green thread-like leaves, the stalks of which are dilated to clasp the hollow



stems at the base. The leaves are used for fish sauces; the stalks are used in salads, and the seeds that succeed the umbels of green flowers are employed in confectionery, flavouring liqueurs, &c. The plant grows in any garden soil, and is increased by division or from seeds.

The Florence or Finnochia Fennel (*F. dulce*) is an Italian annual of dwarf compact growth, not exceeding  $2\frac{1}{2}$  ft. high. It has large swollen leaf-stalks (fig. 506), which are blanched and eaten raw with pepper and salt, or, if boiled, with fowl, &c. Finnochia may be raised from seeds sown in very warm sheltered spots, in rich soil, about April.

**Garlic** (*Allium sativum*).—A hardy bulbous perennial from South Europe, highly esteemed on the Continent for its white-skinned or rose-tinted bulbs, which are much used in soups, and in other ways. Garlic may be grown much in the same way as Shallots. The offsets or “cloves” from the older bulbs may be planted in February or early in March in rows about 1 ft. apart, and 6 in. asunder, and covered with about 2 in. of soil. When the leaves wither the bulbs are fit to lift and store away for use. In the most favoured parts Garlic may be planted in early autumn for earlier use the following year.



Fig. 507.—Garlic

**Good King Henry** (*Chenopodium Bonus-Henricus*).—A British perennial of the Spinach family. It grows up to  $2\frac{1}{2}$  ft. high, and has long-stalked, arrow-shaped leaves rather thick and fleshy in texture, with a frosted or crystalline appearance on the under surface. It grows in any garden soil, but does best in rich ground. From April to June the succulent shoots, often as thick as the little finger, are eaten in some parts of the kingdom, notably in Lincolnshire, in lieu of Asparagus. They are boiled in plenty of water, and are served up on toast, or with melted butter, gravy, meat, &c. The plants may be raised from seeds or by division in early spring, and are planted in rows about 18 in. apart, and 1 ft. from each other.

**Horehound** (*Marrubium vulgare*).—The leaves of this British perennial Labiate are used in cough remedies, and also for seasoning. The plant is 1 to  $1\frac{1}{2}$  ft. high, with broadly-ovate wrinkled leaves, and tiers of white flowers. It grows in any garden soil, and is increased from seeds, division, or cuttings.

**Horse-radish** (*Cochlearia Armoracia*).—This British perennial is a member of the Cabbage family, and is valued for its thickish “roots”. These are scraped and used with roast beef and in other ways as a condiment. The plants flourish in any garden soil, and, once established, will take some eradicating. Splendid, shapely, tender-flavoured roots are



obtained from deeply-worked and well-manured soil, and if planted every year so much the better. The roots are cut up into pieces from 2 or 3 to 12 in. long, and are planted about 1 ft. apart in rows 2 ft. wide, although some favour rows 3 ft., and 18 in. between the sets. Planting takes place from January to the end of March in favourable weather. The roots will be ready for use the following winter. Some growers plant the cuttings deeply, 1 ft. or more from the surface, by making a hole with a stout stick or a piece of iron, and some use long pieces and others short ones. They all grow whether planted vertically or horizontally, but the most saleable roots come from the sets that have had the crowns buried about 1 ft. from the surface. When sent to market they are tied in bundles (fig. 508), the straightest and most shapely ones naturally finding the quickest sale.



Fig. 508.—Horse-radish

**Hyssop** (*Hyssopus officinalis*).—An evergreen South European under-shrub with oblong lance-shaped leaves, and whorled spikes of white, blue, or pinkish flowers. The aromatic leaves and shoots are used as a condiment and for flavouring.

The flowering shoots are used to make expectorant infusions. Plants flourish in light soil, and are raised from seeds, cuttings, or division, and when established, require 1 ft. apart each way.



Fig. 509.—Liquorice (*Glycyrrhiza glabra*)

**Liquorice** (*Glycyrrhiza glabra*).—At one time Liquorice (fig. 509) was extensively grown in the Mitcham neighbourhood, but for years past it has not been a crop sufficiently remunerative to encourage development. It is a leguminous plant 3 to 4 ft. high, with somewhat clammy branches and leaflets, and spikes of pale-blue flowers. It likes deeply dug or trenched sandy soil well enriched with decayed manure, and is raised from cuttings of pieces of root-stems having a bud or two. About 3 ft. of space is given to each plant, the ground

between the rows being cropped with Cabbages, Lettuces, or other vegetables until the Liquorice fills all the space. Each year the tops are cut down close to the ground, and the soil is dug and manured between the



rows. The crop is fit to harvest at the end of the third year, and considerable labour is required to lift the roots which have penetrated the soil very deeply. The usual method is to dig a deep trench alongside the first row, thus exposing the roots, which are then dug out, or pulled out with ropes. The roots may be stored in pits like Beetroots and Carrots until wanted.

**Marigold** (*Calendula officinalis*).—This has already been referred to in Vol. II, p. 14. The flowers are used for colouring butter, flavouring soups, &c. Between June and September they are gathered and hung up in the shade to dry slowly, after which they are stored for winter use.

**Marjoram** (*Origanum vulgare*).—This British plant grows in almost any soil, and may be raised from seeds or division. The Pot Marjoram (*O. Onites*) is a native of Sicily, and is propagated from cuttings in early summer, or by division in spring. It likes warm, dryish soil. The Sweet or Knotted Marjoram (*O. Majorana*) is a tender Egyptian biennial. It is raised annually from seeds sown broadcast or in drills on warm borders in spring; or it may be raised in a hotbed and afterwards planted out in May. The Winter Sweet Marjoram (*O. Heracleoticum*) is a hardy South European perennial, increased by division in spring or autumn. The aromatic leaves of the various kinds are used for seasoning soups, &c. The shoots are cut as the plants are coming into flower, and are hung up in the shade to dry slowly, being afterwards stored for use.

**Mint or Spearmint** (*Mentha viridis*).—This British and European perennial is now cultivated extensively both in the open air and under glass by many market gardeners, and has been dealt with specially at p. 116. Peppermint (*M. piperita*), so much used for the preparation of the cordial bearing its name, may be grown in the same way as the ordinary Mint, in any good garden soil. Pennyroyal (*M. Pulegium*) emits a powerful aromatic odour, and is used medicinally. It likes strong loamy soil, and is increased by division.

**Mustard** (*Sinapis alba*).—This quick-growing European annual is usually grown with Cress (see p. 190), although another plant, Rape (*Brassica Napus*), owing to its somewhat milder flavour, is often substituted for it. The roundish white seeds of Mustard germinate quickly, and for salad purposes the stalks are cut quite young before the true leaves begin to appear, and are packed in punnets in the same way as Cress. A fresh crop can be obtained every week or so during the season by means of repeated sowings.

**Nasturtium or Indian Cress** (*Tropaeolum majus*).—This well-known plant, although a perennial in its native home, Peru, is generally treated as an annual in cultivation. As a decorative flower-garden plant it is referred to in Vol. II, p. 73, and that is the chief rôle it and its varieties and hybrids play in British gardens. It practically has no other commercial value. The leaves, young shoots, and flowers are sometimes eaten as salad, or between thin slices of bread and butter. They possess a "cressy" flavour, although the plants really belong to the Geranium family.



The tubers of *T. tuberosum* are a favourite dish in South America, where they are first boiled and afterwards frozen before being eaten.

They are yellowish mottled with crimson, but are more valuable as flowering plants in Britain than as herbs or salads. (See Vol. II, p. 111.)



Fig. 510.—Orache (*Atriplex hortensis*)

the “White Orache”, with pale yellowish leaves; the “Dark Red Orache”, the stems and leaves of which are of a deep-red colour, which, however,

disappears in the cooking; and the “Green Orache”, the leaves of which are rounder than those of the “White” variety, and are also deep green in colour.



Fig. 511.—Purslane (*Portulaca oleracea*)

**Purslane** (*Portulaca oleracea*).

—This Indian annual (fig. 511) has juicy stems and leaves which are eaten cooked, or raw as a salad, and are sometimes pickled. Seeds may be sown in April or May, and monthly till August, in warm sunny spots, in drills about 9 in. apart, for a supply in summer and autumn. Early supplies are obtained by sowing on hotbeds from December to March. The varieties known include the “Green”, a vigorous form of the common type; the “Golden”, with yellowish leaves; and the

“Large-leaved Golden”, which has leaves at least twice as large as those of the others.



**Rampion** (*Campanula Rapunculus*).—This European biennial (fig. 512) has white spindle-shaped roots which are eaten raw or cooked. The leaves as well as the roots are sometimes used in winter salads. The Rampion prefers a light rich soil and partially shaded situations. It is best raised from seed sown between March and July, in nicely prepared soil, in very shallow drills, as the seeds are very small. The young plants are thinned out 4 or 5 in. apart. The roots will be ready for use from November to April and May. If allowed to remain in the ground they will throw up flower stems about 2 ft. high the following summer. (See Vol. II, p. 16.)



Fig. 512.—Rampion (*Campanula Rapunculus*)



Fig. 513.—Rue (*Ruta graveolens*)

**Rue** (*Ruta graveolens*).—An evergreen herbaceous undershrub, native of South Europe, known in some places as the “Herb of Grace”, and “Countryman’s Treacle”. It grows 2 to 3 ft. high, and has deeply divided blue-green leaves and greenish flowers in summer. The leaves, which have a strong and almost disagreeable odour, are sometimes used for seasoning, garnishing, and for medicinal purposes; they are also administered to poultry having the roup. The plant grows in almost any soil, preferably a poor one. It is usually increased by slips or cuttings in late summer or autumn, placed in a sheltered border or in a frame; it may also be raised from seeds sown in spring.

**Sage** (*Salvia officinalis*).—This bushy evergreen undershrub of the Labiate family is grown in some market gardens where the plants are rarely disturbed. Mitcham has always been a great Sage-growing centre, owing, no doubt, to the chalky nature of its subsoil, which is particularly suitable not only for Sage, but also for the production of the best Lavender. The grey-green leaves of Sage are largely used for seasoning. The young side and top shoots are selected for use just before the purple or whitish



flowers expand, and when required for winter use they are tied in bunches and hung up to dry slowly in a shady, well-ventilated place. The chief method of propagation is by cuttings or slips of the ripened wood inserted in sandy soil in early autumn.

**Salsafy or Vegetable Oyster** (*Tragopogon porrifolius*).—This European biennial belongs to the Dandelion and Chicory family, and is valued for its fleshy tapering tap roots (fig. 514). The leaves are long, straight, and narrow, greyish-green, with a whitish midrib. The flower heads are violet.

The soil should be deeply dug or trenched, and contain a fair supply of humus. Seeds are sown in March or April, in drills about 1 in. deep and 1 ft. apart, and the seedlings are thinned out to 4, 6, or 8 in. apart, the last-named distance being best as a rule. During the season the hoe should be used between the rows and the plants, especially in dry periods. The roots will be fit for lifting in October and November, and may be stored in dry sand or soil during the winter months until wanted for use. The skin is yellowish but the flesh is white. When scraped and boiled, and served up with melted butter, &c., they make a good dish. There are a few varieties of Salsafy grown for market, among the best being *Giant French Mammoth* and the *Mammoth Sandwich Island*.



Fig. 514.—Salsafy (*Tragopogon porrifolius*)

**Savory.**—There are two kinds of Savory—the Summer Savory (*Satureia hortensis*), an annual; and the Winter Savory (*S. montana*), a low-growing spreading perennial, both natives of South Europe, and belonging to the Labiate family. The Summer Savory is a fragrant plant, 6 to 9 in. high, and its narrow leaves and young shoots are used for flavouring boiled beans, soups, &c. It is raised from seeds sown in the open in drills 1 ft. apart, the seedlings being thinned out to 6 or 9 in. When

the buds of the pale lilac or whitish flowers appear, the stems are cut off and hung up to dry for future use.

The Winter Savory also has narrow, sharply-pointed leaves, and pale-purple, pinkish, or white flowers. It is practically hardy in the milder parts of the kingdom, and if the tops are cut down every spring, there will be a good crop of young shoots for cutting. Increase of stock is secured by means of seeds, cuttings, and slips.

**Scorzonera** (*Scorzonera hispanica*).—This is closely related to the Salsafy and belongs to the same family (Compositæ), but may be distinguished by the blackish skin of its tap roots, by its broader lance-shaped oblong and pointed leaves, and by its bright-yellow flower heads.



Although really a perennial plant, it is cultivated as an annual crop in the same way as the Salsafy. Being a hardier plant than Salsafy, the roots may be left in the soil in winter if necessary. Besides the ordinary variety, there is a large-rooted one called the "Giant Russian".



Fig. 515.—Scorzonera (*Scorzonera hispanica*)

**Sorrel** (*Rumex Acetosa*).—This member of the Rhubarb family is grown in small quantities by some market gardeners, more or less as a catch crop, between the rows of fruit trees and bushes. The clumps are planted 1 to 1½ ft. apart in rows about 2 ft. wide, and a deep, moist, loamy soil is preferred. Under good tillage the leaves attain a large size, and are picked for



Fig. 516.—Belleville Sorrel (*Rumex Acetosa*)

market in the same way as those of Spinach. The finest foliage develops in moist and partially shaded positions, and once a plantation is established it will last for a few years. Propagation is effected by division of the clumps, or plants may be raised from seeds sown thinly in drills where the plants are to remain.

There are several varieties; one of the best, and that favoured by the French market gardeners, is known as the Broad-leaved Belleville (fig. 516), the leaves of which are very large and luscious, and of a pleasantly acid flavour. Other kinds are the Round-leaved Sorrel (*R. scutatus*), and the Mountain Sorrel (*R. montanus*). A form of the last-named, called Maiden or Dutch Sorrel, rarely flowers or seeds; it is now much grown in France. Once established, it produces crops of fine leaves for several years.

**Southernwood** (*Artemisia Abrotanum*).—This is a fragrant shrubby plant with finely cut grey-green leaves and small yellowish flowers. It grows in almost any soil, damp or dry, and possesses medicinal properties resembling those of the Wormwood. The leaves are sometimes used for flavouring.

**Tansy** (*Tanacetum vulgare*).—An aromatic European perennial, about 3 ft. high, with oval-oblong leaves deeply cut into very narrow segments,



each of which is also deeply cut into still narrower portions. The flower-heads are deep yellow. The plants grow in any soil, and flourish for years in the same place. The young leaves are used for flavouring, colouring puddings, &c.

**Tarragon** (*Artemisia Dracunculus*).—This relative of the Southern-



Fig. 517.—Tarragon (*Artemisia Dracunculus*)

wood and Wormwood is a native of Siberia. It is a perennial about 2 ft. high, with lance-shaped aromatic leaves and small whitish flowers in summer. It flourishes in any garden soil in warm sheltered spots. It is increased by division in spring, and by cuttings in summer, inserted in sandy soil in frames or sheltered and shady borders. Established plants will last for years with a little protection over the crowns in severe winters. The leaves and tops are used in soups

and salads, pickled with gherkins, &c. They are also infused in vinegar to make Tarragon vinegar.

**Thyme** (*Thymus vulgaris*).—The common Thyme is a dwarf compact shrubby plant with wiry stems and small deep-green triangular leaves, greyish beneath. There are narrow-leaved and broad-leaved forms, the latter being a taller and bigger plant in every way. The Lemon Thyme (*T. Citriodorus*) and the Wild Thyme, or Mother-of-Thyme, are also grown (*T. Serpyllum*), as well as a golden-leaved form of the Lemon Thyme.

All kinds are largely used for flavouring soups, stuffing, &c., the leaves and young shoots being picked for such purposes, tied in bunches and dried slowly. Thyme is often grown as an edging plant, and is divided every third or fourth year. It is also raised from seed sown in drills or broadcast, the young plants being afterwards thinned out 3 or 4 in. apart. A light, rich, and deeply-worked soil and warm situations are best. The oil of Red Thyme is largely used in perfumery.

**Watercress**.—The cultivation of Watercress (*Nasturtium officinale*) is carried on in various parts of Herts, Bucks, Essex, Berks, Surrey, Hants, and Dorset, in areas varying from  $\frac{1}{2}$  ac. up to as much as 15 ac. in extent; and although the greater consumption of such early salads as lettuces, radishes, cucumbers, and tomatoes has entered into competition with it, the trade in Watercress is perhaps more extended now than ever before. There are two kinds of Watercress grown for market, viz. the "brown" and the "green". The brown is distinguished from the green by the purple brown on the leaf stalks and main veins, the green variety lacking this colour. From a cultural point of view the "brown" also differs considerably from the "green" in that it must be grown in pure





Photo W. J. V. Co.

# WATERCRESS BEDS IN BERKSHIRE

The upper photo shows beds in terraces; the lower one, beds on the flat





spring water that has passed through a chalky subsoil, while the "green" Cress flourishes in clean running river or canal water, the latter being considered better by specialists. Another point of difference is that the "brown" Cress is best for winter and spring sale, from Christmas to the middle of June, while the "green" is favoured at other times.

In most places Watercress is grown in natural spring or river water in beds or ditches, sometimes arranged in terraces and varying in width from a few feet to 20 or 30 ft., the depth in all cases being only 3 or 4 in. At Chesham, Bucks, however, Messrs. Beckley & Holliman have converted 10 ac. of gravel pits into excellent Watercress beds by means of artesian wells. These are sunk to a depth of 120 to 150 ft., with a 4-in. bore, and cost from £15 to £50 each. Each well throws about 1000 gall. of pure spring water per hour through the deep layers of chalk in the valley of the Chess. The main crop consists of "brown" Cress, although where the softer water from the Chess is available a certain amount of "green" Cress is also grown in about another 5 ac. The artesian well water has the advantage of being always of the same temperature (about 40° F.) in winter and summer, and as the beds slope gently from one end to the other there is always a stream of fresh, cool water running through the beds, which in this case vary from 30 to 35 ft. in width to 300 ft. or a little more in length, with a pathway about 4 ft. wide separating one bed from another.

Watercress is propagated by pieces of the plants placed in beds that have been cleaned out with hard bristle brooms, so that the gravelly bottom is quite freed from muddy deposit and weedy vegetation. The cuttings are placed in the stream with the heads facing downhill, and they root and grow so readily that picking may be commenced about six or eight weeks afterwards. Half the area is planted each year, between the middle of June and Christmas, and each bed is cut systematically every six or eight weeks during the year with a kind of shoemaker's knife. When the growth in spring, however, is too rapid, the plants are pulled out, roots and all, to give space to the others, and are then taken to watersheds and cut and packed for market. The men engaged in this work wear strong leather boots coming well above the knees. These boots cost about 50s. a pair, and last about eighteen months. Besides cutting and packing, the beds must be kept free from dead or decaying leaves and shoots, and also from scum. For this purpose toothless wooden rakes are passed over the plants in the direction of the stream, and all refuse is thrown on to the adjoining pathways, from which it soon melts away to nothing. It may sound curious in connection with an aquatic plant, but growers like to have nice warm rains falling on the Watercress beds in spring, as growth is thus greatly increased and larger quantities can be cut for market.

Watercress after cutting is washed and cleaned from old or yellowing leaves in the pure running water, and is then packed, bunched or unbunched, in "flats" holding 56 lb. net, or in "half-flats" holding 28 lb.



net. A flat holds 16 dozen bunches, a half-flat holding just half the quantity, and measuring 20 in. by 16 in. by 6 in. The busiest period is from the end of March to the middle of June, when Messrs. Beckley & Holliman cut about 12 tons of cress weekly from their beds and send it all over the kingdom, although Brentford market absorbs the greater portion.

An acre of Watercress beds will yield, under favourable conditions and proper care, from 15 to 20 tons of cress per annum, and the prices realized vary from £9 to £12 per ton. The cost of production is great. Rent varies from £20 to £50 per acre, exclusive of rates, and wages take a big bite out of the returns.

The cost of carriage varies from 1s. 2d. per cwt. to London, to 2s. 3d. to Manchester, 3s. 3d. to Blackburn and Preston, and 3s. 6d. to Blackpool and Southport. These prices have,

however, been raised 25 per cent in 1912, and represent from 25s. to 19s. 8d. per ton to the railway companies, and in addition to rent make a heavy drain upon the resources of the Watercress grower.

[J. W.]

The **Wood Sorrel** (*Oxalis Acetosella*) belongs to a quite different family (Geraniaceæ) from the ordinary Sorrel, and is often called the Shamrock by the uninitiated. It grows wild in cool, shady places, and its leaves are sometimes eaten as a salad, having an acid flavour somewhat similar to that of the Sorrel proper.

**Wormwood** (*Artemisia Absinthium*).—A silky hardy perennial with divided leaves and arching sprays of small yellow flower-heads, having an aromatic and somewhat bitter properties.

It is best grown in rather poor soil, and in warm places. It may be raised from seeds and also by division in spring, or from cuttings. The shoots and leaves are used for various purposes, including vermifuges, tonics, stomachics, and in the production of absinth (fig. 518).



Fig. 518.—Wormwood (*Artemisia Absinthium*)

## SECTION XXXIV

# French Gardening or Intensive Cultivation

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### § 1. GENERAL

For over three hundred years market gardeners, or *marâtchers*, in the neighbourhood of Paris and other parts of France have practised a wonderful system of cultivation, by means of which they succeed in obtaining several large crops of salads and vegetables from a comparatively small patch of ground in the course of the year. Notwithstanding the improvements in greenhouse structures and heating apparatus the French gardener still continues to grow his Lettuces, Carrots, Cauliflowers, Radishes, Endives, Turnips, and Melons in the same way as his forefathers, and in many cases the mysteries of the art have been transmitted from father to son for several generations. Even now, when one fears that the almost universal adoption of the motor car will render it more and more difficult to obtain manure easily and at a reasonable rate, there seems to be no abatement in the number of gardens, nor in the amount of produce from them. While it is, of course, possible that motor cars will interfere to a certain extent with the massing of manure in the large cities, it may be taken for granted that there will be no appreciable reduction in the number of horses as a whole, either in France, in the United Kingdom, or in Germany. What is, however, likely to happen is that the manure will be more widely distributed throughout the country, and provincial growers may have as good an opportunity of obtaining large supplies as their brethren have hitherto had in the neighbourhood of large cities like London, and Paris, and Berlin. But good manure and plenty of it is one of the first essentials wherever the French system of intensive cultivation is to be practised.

In many quarters there is an impression that even if manure should become scarce its place can be easily taken by hot water. This is a delusion, and one likely to prove costly to those who rely upon it. In the first place, the great advantage of having plenty of manure is that the beds can be made in different parts of the garden year after year, and even during each season of growth, without one bed interfering with



# Commercial Gardening

another, or the crops upon it. Whereas, if hot water is used, the pipes and structures are fixtures in one particular spot, and cannot be interfered with or moved from place to place with ease. And, again, to secure anything like a reasonable minimum output on commercial lines, far more glass would have to be used with hot-water apparatus than is necessary under the true French system, where only manure, lights and frames, and bell glasses are used. Perhaps these facts will appear more forcible from a comparison between the material required to cultivate a 2-ac. French garden and a similar area of ground under glass in the usual way.

## I. FRAMES AND BELL GLASSES (CLOCHES) FOR A TWO-ACRE FRENCH GARDEN.

	Square yards.	Square yards.
900 lights (for 300 frames) ... ..	= 1800	
20 per cent allowance for pathways ...	= 360	= 2160
3000 cloches ... ..	= 600	
20 per cent allowance for pathways ...	= 100	= 700
Total space covered with glass ... ..		= 2860
Total space uncovered but useful for other crops		= 6820
Area of 2 ac. ... ..		= <u>9680</u>

It will thus be seen that when every light and every cloche is in use, and making an allowance for pathways, only 2860 sq. yd.—or less than one-third of the whole area—is covered with glass, most of the remaining two-thirds being available for other successional crops. And it must be remembered that some of the ground which is open one season will be covered with cloches and frames the next, so that a perfect rotation of crops and a thorough sweetening and “sterilizing” of the soil by exposure to the weather takes place in regular order.

II. TWO ACRES OF GROUND COVERED WITH GREENHOUSES.—To cover this space with modern greenhouses would take twelve houses, each 240 ft. long and 30 ft. wide, each greenhouse covering 800 sq. yd., or about  $\frac{1}{3}$  ac. The cost of twelve such houses would be not less than £4560, and probably a good deal more, according to the quantity of piping used, and the kind of boiler, to say nothing of the cost of coal and coke needed to maintain the requisite warmth.

The cost of the plant for a 2-ac. French garden would be approximately:

300 frames and 900 lights ... ..	£450
3000 cloches at £5 per 100 ... ..	150

making a total of £600, or nearly £4000 less than the capital outlay for covering 2 ac. with greenhouses.

About 1000 mats would be necessary for a French garden at a cost of about £70, but only about one-third of these would have to be replaced after the first two or three years.

Each year also about 800 tons of manure, at a cost of about £240, would

have to be secured for the French garden; but as the great bulk of this manure would be available for the improvement of the soil under open-air crops year after year, it cannot be looked upon as a loss after use, but rather as a valuable asset that is never realizeable when gardening purely under glass.

The disadvantages of gardening under immovable glass structures are fairly obvious. The natural soil, if cultivated, can never be exposed to the sweetening influences of the weather, and if it should happen to be infested with Wireworms, Cockchafer grubs, Eelworms, or fungoid diseases, the expense and trouble of clearing it is sometimes enormous. On the other hand, if stages are erected, and plants are grown in pots, a large extra outlay is necessary, both as regards capital and annual expenditure for staging, pots, soils, manures, and fuel.

As to labour, it is really no more costly, and no more incessant, than in gardening under glass; but it is a little more so than in ordinary open-air market gardening as practised in the British Islands. It is just as essential, under the French system, to give the plants water, to ventilate the frames and cloches, to shade from the sun, or protect from frost, even as one must attend to these operations at all times when growing Tomatoes, Cucumbers, Melons, Ferns, Zonal Pelargoniums, or other crops under glass during the winter and spring months.

The reputation of incessant labour and ceaseless toil which has been given to French gardening in Britain by some has been obtained chiefly from those who thought to make a fortune in a miraculously short time without having to work for it, and without having had any experience in plant cultivation or the disposal of produce. With such novices failures have been numerous, but in the hands of expert cultivators, who are also business men, the French system of intensive cultivation deserves careful consideration.

For example, consider the hot season of 1911. The British market gardener had not a lettuce (cos or cabbage) to sell until about the last week in May, from the open ground, and then 25 per cent of the crop at least was wasted. And in July, with an absence of rain for twenty-four days, and the thermometer frequently showing 85° F. in the shade, there was scarcely a lettuce or a radish to be obtained in any of the big markets. If ever the British market gardener missed his chance of making money out of Lettuces it was in the summer of 1911, and no doubt in other hot summers of previous years. But the French growers who use no glass during the summer can always rely, owing to their system of cultivation, upon beautifully luscious crops of Lettuces, &c., at high prices, while their British brethren are confining their attentions to Dwarf and Runner Beans which often realize only from 6d. to 1s. per bushel.

Although some assert that there is nothing in the French system, and that it is only an old English one that has been dropped, the fact remains that the French *marâcher* has tender salads all the year round, and is filling his pockets with money, while in England the Lettuces, Radishes,



Cauliflowers, and Carrots, &c., are usually left to the untender mercies of a fickle climate.

Amongst the many arguments used against the adoption of the French system is the one that our climate is so much worse and so much colder than that of Paris. There is not much in this, as a reference to meteorological tables will show. Paris has an average of about 21 in. of rain per annum against 24 in. at Kew and 28 in. at Rothamsted. There is very little difference in the mean temperature between Paris, Kew, and Rothamsted. Taken on the whole, Paris has the advantage of a little over 1° F. The average mean temperature of Paris for thirty-six years is recorded at 51·55° F., while London is quoted at 50·50° F. But there are many places in the United Kingdom with a higher average mean temperature than Paris.

As to sunshine, the annual average for twenty-five years at Kew is 1457·8 hr., for Rothamsted the annual average for thirty-one years is 1605 hr., and for Paris (ten years' average) 1796 hr.

The following figures show the average number of hours' sunshine at each place for every month in the year:—

	Jan.	Feb.	March.	April.	May.	June.	July.
KEW—25 Years ...	41·3	55·0	104·7	147·4	199·1	195·0	207·9
ROTHAMSTED—31 Years	53·0	71·0	120·0	166·0	194·0	204·0	223·0
PARIS (Parc St. Maur) } —10 Years ... ... }	70·1	81·1	129·7	169·6	222·8	227·1	260·1

	August.	Sept.	October.	Nov.	Dec.	TOTAL.
KEW—25 Years ...	188·6	141·1	92·3	49·5	35·9	1457·8 hours.
ROTHAMSTED—31 Years	204·0	162·0	106·0	59·0	43·0	1605·0 „
PARIS (Parc St. Maur) } —10 Years ... ... }	239·6	170·9	116·6	64·2	44·2	1796·0 „

It may be noted that July, 1911, beat all records for sunshine in England, 323 hr. being recorded in London against a twenty-five years' average at Kew of 207·9 hr. and a thirty-one years' average at Rothamsted of 223 hr. The month of July in some previous years also shows some high records, thus—1881, 251 hr.; 1887, 281 hr.; 1897, 262 hr.; 1899, 265 hr.; 1904, 265 hr.; and 1906, 249 hr. These figures show that after all the British market gardener is on the whole practically as well off in the neighbourhood of London as his brother near Paris so far as climatic conditions are concerned. There is simply a difference in the methods of cultivation, and it cannot be gainsaid that the Frenchman can produce as much greenstuff with his hotbeds, frames, and cloches on 2 ac. of land as the British commercial grower can on 10 or 12 ac.

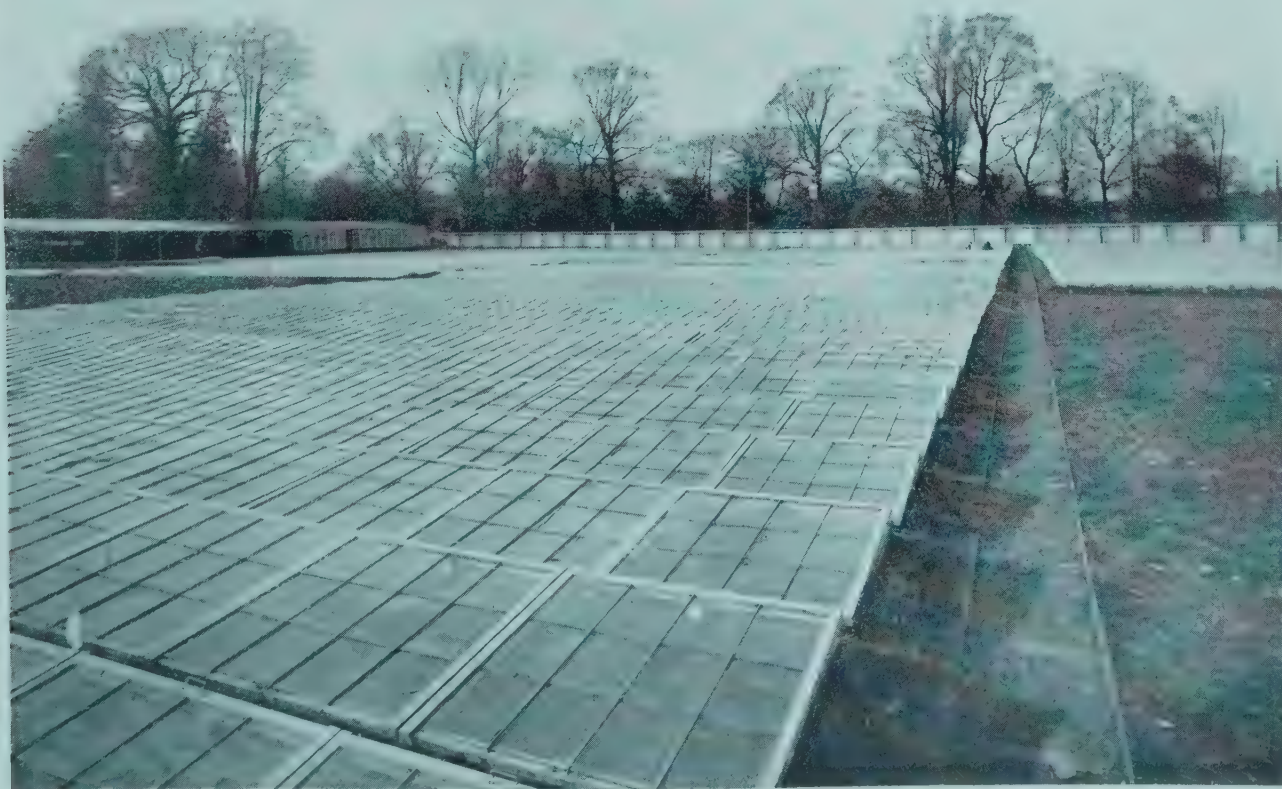
As to rent there is really no comparison. Land for vegetable growing





Photo. *Daily Mirror*

DEMONSTRATION OF FRENCH GARDENING  
At the Royal Botanic Gardens, Regent's Park, 1910



VIEW IN THE BURHILL FRENCH GARDEN, WALTON-ON-THAMES  
Showing portion of 2000 lights and 10,000 cloches, with railway track





and salads may be obtained at a rental of £2 to £4 per acre not many miles even from London. The French *marâcher*, however, has to pay from £30 to £50 per acre rent to the man who "owns" the ground. To start with, the rent question alone puts the French gardener at a tremendous disadvantage.

**Site and Aspect.**—The best site for a French garden is one not too far from a supply of good stable manure; where water can be obtained in abundance either from a company on reasonable terms, or by means of a well, stream, or pond; and where the ground is of fairly good natural texture with a gentle slope between the south-east and south-west. The site should be protected by low fences, hedges, or walls on the northern and eastern sides. It should also be sheltered from south-westerly gales, as these may do much damage in lifting the lights and cloches in tempestuous weather. A position some little distance away from the sea should be chosen in any case, otherwise the winds carrying salt spray are likely to do much injury to the tender foliage of the various crops. So far as shape is concerned a square or rectangular piece of ground is most suitable, as the beds are made in parallelograms running east and west, and the intersecting pathways are at right angles to them with the waterpipes beneath.

If wooden fences or walls surround the garden they may be utilized for the cultivation of Peaches and Nectarines on the south aspect, and Apples, Pears, or Plums on the east and west. The borders all round the fences are very useful for different succession crops, owing to the varying aspects, and the main pathways are useful to enable the produce to be brought from the frames or beds without too much circumambulation. If funds permit, it will pay to have a light railway put down on these, with a turntable at each main junction. Over such light railway, trolleys holding large quantities of produce can be trundled along readily from the frames, cloches, or beds to the packing shed, and will save a good deal of time and labour and consequently money.

**Requisites for a French Garden.**—It is impossible to run a garden on the lines laid down by French *marâchers* without a good supply of: (1) good stable manure; (2) frames and lights; (3) cloches or bell glasses; (4) water; (5) mats. And to these must be added the personal qualities of cultural skill and dexterity, intelligence, and business ability and application, and of course a fair amount of capital. These are all cogs in one big wheel, which if worked as a whole lead to success, but if worked as units and without due regard to their bearing or influence on each other are almost sure to lead to disaster.

**Manure.**—This should be the best manure from stables, and a good supply should be readily obtainable. Cow manure, pig manure, &c., are valuable in small quantities mixed with stable manure, and so also are the leaves of Oaks, Beeches, Sweet Chestnuts, and Elms, as they generate and retain heat for a considerable period.

The quantity of manure required annually will depend largely upon the number of frames and cloches used, and the first year will be more



expensive than those succeeding. Taking one three-light frame (13 ft. by 4 ft. 5 in.) as a unit (and thirty cloches as corresponding in area), about 2 tons of stable manure per frame would be required for the season's work. Thus a garden containing 300 frames and 3000 cloches would require about 800 tons of manure annually, at a cost varying from 4s. to 7s. per ton. The first year or two, however, it would be well to have about 1000 tons, in case of accident, for extra linings, &c.

The manure should be brought in at intervals, from August to November, so that it may not be all fresh or all stale at one time. The manure should be stacked up in square heaps if dry, and should be watered and turned occasionally to bring it into a proper state for making up the beds.

Early in the season very little fresh hot manure is necessary, owing to the mild weather, but in the depth of winter plenty of hot steaming manure must be used. This is not only necessary to generate the requisite heat in the frames and cloches, but also to maintain it by "lining" the frames, that is, banking them up outside and between each other. In this way only can the heat be maintained in severe winters, and two or three layers of mats may be also necessary over the lights and cloches if very hard frosts indeed prevail.

**Making the Beds.**—All plant beds in French gardens, whether under frames or cloches or in the open air, are of uniform width, namely, 4 ft. 5 in., with a pathway of 1 ft. between, making 5 ft. 5 in. altogether. The length may vary, but, as a rule, they are arranged so that five frames with fifteen lights are placed end to end, thus making the length of each bed about 65 ft. before an intersecting pathway comes. By arranging all the beds in this way the frames and cloches are readily interchangeable from one bed to another. This is a great advantage, as it often happens that frames and lights and cloches that might otherwise be lying idle after their crops have been gathered, are immediately transferred over other crops, which will be hastened into maturity more quickly by the extra warmth and protection.

It should be mentioned that frames and pathways are purposely narrow for two reasons. First, during the winter season it would be often dangerous to open the lights or cloches to supply water to the crops, as the latter might be chilled and checked so much in growth that they would be a failure. Water, however, being an essential of plant growth, must be present in sufficient abundance, or the crops would also fail. To avoid this, the rain or water falling on the frames drips into the narrow pathways between and is soaked up by the manure in the same way that water is soaked up by a sponge. The beds, being only about 4 ft. 6 in. wide, allow therefore for a soakage inwards and upwards by capillary attraction for about 2 ft. 3 in. on each side from the pathways. It is fairly obvious that if the beds were, say, 6 or 8 ft. wide, the plants in the centre would probably perish either from drought, or by giving them water overhead the entire crop would be endangered.

In the second place, the pathways are narrow to economize manure, and so that a more regular heat can be maintained when they are filled right up with hot manure in severe weather. These important facts have been overlooked in some English market gardens where the French system has been "tried", or rather misapplied.

To carry manure about, a peculiar kind of wicker basket, called a *hotte*, is used by French gardeners. The general appearance of it may be seen in fig. 519. It is essential to have this basket, and to carry it on the back by means of the two leather straps that go over the shoulders, as it would be quite impossible to use a wheelbarrow in the narrow pathways (1 ft. wide) between the frames and beds of cloches. Ordinary *hottes* hold more manure than a big box wheelbarrow, and the French gardeners say they would rather carry manure a whole day in a *hotte* than they would wheel it for half a day in an ordinary English wheelbarrow. Such is taste and custom!



Fig. 519.—French Manure Basket (*hotte*)

To fill a *hotte* with manure it is placed on a tripod stand, made of wood or iron, quite close to the manure heap. When full, the workman places a strap over each shoulder and marches off with the manure to the desired spot. An expert can unload the basket quite easily, but the novice, in attempting to unload, will be probably turned "head over heels" in the manure itself, and get his feet entangled in the straps. Novices, therefore, should not be employed to carry or deposit manure between rows of frames and cloches.

**Frames.**—The frames used are made of rough deal boards 1 in. or more thick. The length is invariably 13 ft. The back board is 8 or 9 in. high, and the front one about 7 in., so that when covered with lights



Fig. 520.—A Three-light Frame as used in French Gardens

there is just a sufficient slope to carry away the water into the narrow pathways. There is a stout post at each corner, those at the back being 13 or 14 in. long, those in front a couple of inches shorter. In many cases the boards and post are nailed together as fixtures for years, and are still further strengthened by a piece of hoop iron at the corners. An improvement on the fixed frames is to have the two end boards with staples that come through holes in the front and back planks, to which



they are easily attached by a stout iron or wire pin as shown in fig. 520. The advantage of this is, that when the frames are no longer in use in the summer months, they are readily taken to pieces by removing the pins, and the planks are stored away in a very small space until wanted again in autumn. Being cut to uniform sizes, back, front, and sides, there is little to be feared from mixing the boards up, and the pins are easily stored by threading a piece of wire or string through them. A handy man can easily make the frames, but they may also be obtained from dealers like the Cloche Company at a reasonable rate.

**Lights.**—The correct size for these is 4 ft. 5 in. by 4 ft. 3 in. They are made of deal, or with the bottom rail in more costly oak or even iron; and the sash bars, of which there are usually three, are best made of narrow T pieces of iron. In this way, although top putty must be used for the glass, very little of the essential light is excluded during the winter months from the crops in the frames. The French frames differ from those in English gardens in having no horns to knock against a man's shins when walking in the narrow pathways; and even the movable handles, made of stout wire, are placed on top of the wood instead of on the edge, for the same reason. There are two little iron catches screwed into the wood for each light. These prevent the light slipping off when lifted at the back to give water or ventilation.

**Cloches or Bell Glasses.**—These constitute one of the most conspicuous features of a French garden proper from October till May. The orthodox size is made of clear glass with a slight blue-green tint, and measures 17 in. in diameter across the mouth, and is about 15 in. deep (fig. 521). Each cloche weighs about 5½ lb., and will hold 6 gall. of water. With ordinary care they last a lifetime, the original cost being about £5 per 100. If not broken or cracked too badly cloches are easily mended with strips of linen and white lead to hold the cracks together; or by small square pieces of glass stuck on with white lead at intervals where necessary. At one time each cloche had a knob on top, as in the illustration. As, however, this acted as a lens for the sun, and burned the Lettuces, &c., beneath, the knob has been dispensed with by all French market gardeners.

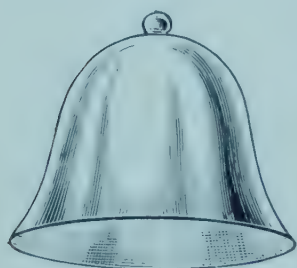


Fig. 521.—Cloche

Cloches have been and are still used largely in English market gardens for the protection of early Cauliflowers and other crops, but the changes are not rung upon them so regularly and ingeniously as they are in French gardens, as may be gleaned by a reference to the diagram at p. 220.

In the springtime, when the sun is becoming powerful, and there is a danger of the Lettuces or Cauliflowers, &c., beneath the cloches becoming burned, a little whitening is rubbed over the south top side for shading purposes. Unless a heavy rain comes, one application may be sufficient for the season: and to ensure that it will be so a handful of fat or butter is often mixed with the whitening before use.





CLOCHES STACKED DURING SUMMER IN A "FRENCH" GARDEN



Photos, Chas. L. Clarke

PLANTING TOMATOES AFTER EARLY POTATOES UNDER GLASS IN JERSEY





Cloches, which are practically miniature greenhouses, are ventilated by means of special pegs or tilts, as shown in fig. 522. These tilts are made of narrow pieces of wood—anything at hand—and have two or three notches cut in them at *right* angles to the back. This enables the worker to take the air off the cloches simply by putting his forefinger on top of the tilt and pressing it backwards. The cloche slips off the notch and falls on to the soft ground without injury. If the cuts are not made at a right angle, but a sharper one, it will be impossible to detach a cloche without using both hands and an enormous waste of time.

It may be added that the ventilation of cloches requires as much care and judgment as that of a greenhouse or hothouse, according to the weather prevailing and the state of growth of the crops.



Fig. 522.—  
Cloche Tilt

During the summer months the cloches, not being wanted, are stacked away in heaps of five, as shown in the plate, in some out-of-the-way part of the garden. Small square pieces of wood are placed between them, so that they shall turn round easily on each other as on a pivot, and not get jammed and broken.

To carry cloches about without breaking them requires some little skill. An expert gardener can carry three in each hand, and put



Fig. 523.—Cloche Carrier

them down without injury. By means of a cloche carrier, however (see fig. 523), he can carry a dozen glasses at once, six in front and six behind, and this is the best and safest method of carrying them any distance.

**Water.**—There must be a copious supply of this, especially from April to September, otherwise the crops may be a complete failure. Indeed the absence of water during the summer months would put the French market gardener on the same dried-up level as the English grower, and he would simply find himself starving on a couple of acres of ground. And one can imagine what growing Lettuces, Carrots, Radishes, Endives, Cauliflowers, Melons, &c., would be like in such a summer as 1911, when the thermometer in July and August frequently reached over 85° in the shade. Water, therefore, in abundance must be secured at all costs, otherwise the crude and unlucrative methods of the agriculturist must be adopted.

To secure a supply of water is really the first thing a prospective *marâcher* should attend to in selecting a piece of land. Site, position, aspect, manurial and other facilities may be perfect, but they are useless unless water can be obtained at a reasonable cost. It may be necessary to sink a well 30, 40, or even 80 ft. deep, and then have it pumped up into a large tank—one of 5000 to 10,000 gall. capacity—by means of an electric, gas, or oil pump. Windmills are not in favour, chiefly because they have a nasty habit of lying becalmed in a frizzling hot summer, when water is more than ever needed. Whichever of these methods of obtaining water is adopted will necessitate an outlay of from £100 to



£200 or more. If a large lake, pond, or good stream is available, so much the better; if a company will supply water at a cheap rate, a good deal of worry and expense may be saved.

Except in the case of a company's water, which can be laid on at high pressure, it will be necessary in other cases to build a tower 25 to 30 ft. high to hold the cistern on top. In this way a tremendous force of water can be secured, and this is necessary to distribute the water by means of hose pipes over one bed after another from the various stand pipes that will spring up from the pipes beneath the pathways. About 620 yd. run of 2-in. water pipe, and 120 yd. of 3-in. pipe, would be necessary to distribute the water effectively over a 2-ac. garden; and about fifty stand pipes should be fixed at regular distances for the use of hose pipes. In this way there is not the slightest difficulty beyond the labour in thoroughly watering a 2-ac. garden twice a day during the summer months if necessary.

To secure a perfect flow and good force the pipes from the cistern should be 4-in. ones, joining on to the 3-in. pipe running along the top or northern end of the garden, and from this 3-in. pipe the 2-in. ones with stand pipes would run at right angles north and south, and about 68 ft. apart.

**Mats.**—These are made of rye straw, which is better because lighter and more durable, and does not hold the wet so much as wheat or oat or barley straw. The usual size of a rye-straw mat is 5 ft. long by 4½ ft. wide, and the weight is about 11 to 12 lb. The mats are made on a special frame, and the stands are kept in place by five strings of twine. To preserve the mats, and also to ward off attacks of fungoid diseases and mice, &c., the mats before sale are always steeped in a solution of copper sulphate. With fair wear and tear a mat will last three or four years, and costs in the first place at present about 1s. 3d. The high price is probably due to one of the numerous "syndicates" in France. It ought to be possible to make good rye-straw mats in the United

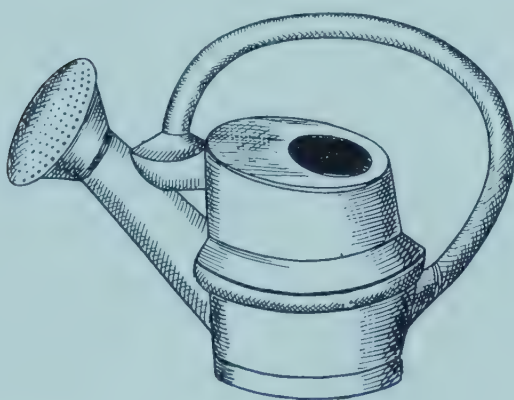


Fig. 524.—French Waterpot

Kingdom at a price that would be more attractive than the present French one.

**Miscellaneous.**—Other implements, &c., besides those mentioned will be useful. Spades, forks (digging and manure), hoes, line and reel, hand barrows without legs (for carrying mats between

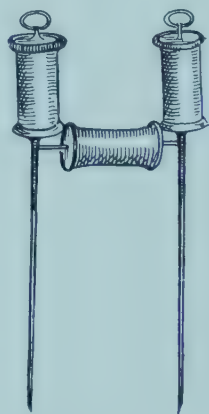


Fig. 525.—Hose Carrier

the frames), waterpots of the French type (fig. 524), dibbers, rakes, and the other paraphernalia usual to gardens must be at hand. One instrument (fig. 525) is particularly useful when hose pipes are in use. It is

shaped like the letter **H** in two pieces, with a screw swivel in the centre. The two long legs are stuck in the ground at the corner of a range of beds. The two upright and the horizontal arms are fitted with revolving reels. The hose pipe passes between these, and as it is pulled backwards and forwards it moves readily on the reels, and can be carried round right-angled corners without being trailed over the crops on the adjacent beds. Altogether a useful and ingenious implement.

For packing purposes light wooden crates (fig. 526) are chiefly used. They vary in length from  $22\frac{1}{2}$  to  $24\frac{1}{2}$  in., in width from  $11\frac{1}{4}$  to  $13\frac{3}{4}$  in., and in depth from  $5\frac{1}{2}$  to  $8\frac{1}{2}$  in. These are light, strong, and durable, and cost from 4s. to 8s. per dozen wholesale. It would be a convenience to have cheaper non-returnable chip baskets or crates, as there is a general tendency in these days against being bothered with returning empties which take up space that could be perhaps better utilized.

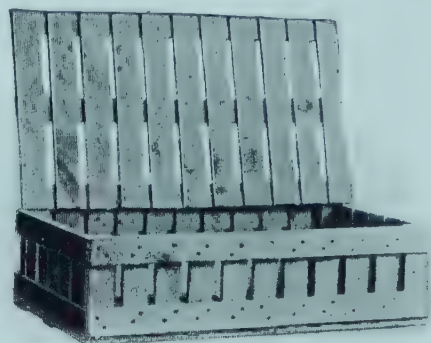


Fig. 526.—Light Wooden Crate for Lettuces, &c.

**Expenses and Receipts of a “French Garden” of Two Acres.**—For commercial purposes it is scarcely worth while establishing a French garden of a less area than 2 ac., while 3 ac., or even 4, thoroughly cultivated according to system, would probably yield larger profits in proportion to the outlay. At the same time, it is possible to obtain valuable returns from only  $\frac{1}{2}$  ac. or 1 ac. of ground if the beds are made up properly, and the frames, lights, and cloches are in constant use during the winter season.

The following figures may be taken as fairly approximate. The expenses are given rather higher than they are likely to be in actual practice, while the receipts are placed on a comparatively low basis.

## I. ESTIMATED ESTABLISHMENT EXPENSES OF A TWO-ACRE FRENCH GARDEN (CAPITAL OUTLAY)

300 frames and 900 lights	...	...	...	...	£450	0	0
3000 cloches @ £5 per 100	...	...	...	...	150	0	0
1000 rye-straw mats @ £7 per 100	...	...	...	...	70	0	0
Horse, van, and harness	...	...	...	...	60	0	0
Water pots, spades, rakes, dibbers	}	...	...	...	16	0	0
Manure baskets and stands, tilts							
Hose pipes, hand barrow, &c.							
Packing shed	...	...	...	...	20	0	0
Miscellaneous	...	...	...	...	25	0	0
					791	0	0
Water supply, pipes, &c. (see p. 211), say	...	...	...	...	180	0	0
Total	...	...	...	...	£971	0	0



# Commercial Gardening

## II. ESTIMATED ANNUAL EXPENSES ON A TWO-ACRE FRENCH GARDEN

Manure, 800 tons @ 6s. per ton	...	...	...	£240	0	0
Labour ...	...	...	...	260	0	0
Horse food	...	...	...	30	0	0
Rent, rates, taxes, insurance	...	...	...	50	0	0
Seeds, depreciation, &c.	...	...	...	50	0	0
Total ...	...	...	...	£630	0	0

## III. ESTIMATED ANNUAL RECEIPTS FROM A TWO-ACRE FRENCH GARDEN

900 lights, produce, @ 12s. each	...	...	...	£540	0	0
3000 cloches, about 1s. 6d. each, say	...	...	...	220	0	0
Open ground (190 poles, say), about 10s. 6d. each, say	...	...	...	100	0	0
Total ...	...	...	...	£860	0	0

It will thus be seen that a profit of £230 may be made on 2 ac. each year with care, being equivalent to about 24 per cent on a capital outlay of £971. The profits, of course, may be either considerably more or very much less according to the business management and the fluctuations of the market.

## § 2. CROPS GROWN IN FRENCH GARDENS

The principal crops grown are Radishes, Lettuces (Cos and Cabbage varieties), Endive, Carrots, Cauliflowers, Turnips, Spinach, Celery, and Canteloupe Melons. These may be regarded as the standard crops, but Corn Salad, Cucumbers, Tomatoes, Aubergines, Cabbages, Sorrel, Leeks, Onions, &c., are sometimes grown as catch crops.

It may be well to say a little about each of the principal crops in alphabetical order.

**Carrots.** — Vast quantities of these are grown, the smaller-rooted varieties, like “Paris Forcing” (*Carotte rouge à forcer*), “Early Forcing Horn” (*Carotte très-courte à chassiss*, or *C. grelot*, *C. Toupie*), “Scarlet Dutch Horn” (*C. rouge court hâtive*, or *C. Bellot*) being preferred for early framework, while the “Half-long Nantes Scarlet” (*C. rouge demi-longue nantaise* or *C. sans cœur*) and the “Half-long Scarlet Carentan” are used for open-air work.

The first crops are sown in the frames in October on finely prepared mould, only a gentle heat from the manure being necessary at this time. On top of the Carrots, Radishes (forcing scarlet white-tipped variety) are also sown. The Radishes, however, grow more quickly than the Carrots, and are picked and marketed before these are any appreciable size. But while both the Radishes and Carrots are germinating, the upper surface of the soil is planted with some “Crêpe” or “Petite noire” Cabbage Lettuces which have been raised in advance from seed sown in September. Thus each frame is actually carrying three crops at one and the same time, viz. Carrots, Radishes, and Cabbage Lettuces. Being of a distinct

nature, and differing in rapidity of growth, one crop is taken off before it is likely to interfere with the others. Thus, although the Lettuces on the surface are more advanced than the Carrots or Radishes, the latter grow very quickly on top of the slower-growing Carrots, and up between the Lettuces. The Radishes, therefore, are the first crop to mature and to be cleared out of the frame; then come the Lettuces, and when they are mature the Carrots have then reached a stage when they will require all the space to themselves. In later crops, however, young Cauliflowers are planted on the north and south edges of the bed for first crops.

This process of ringing the changes on the same patch of soil with three crops at one time is carried on throughout the year, not only under lights and cloches, but also in the open air during the summer months, and explains (what at first seems inexplicable) how the French *marâcher* obtains such an enormous quantity of produce from a small area.

With these early crops of Radishes, Lettuces, and Carrots it must be borne in mind that only as many frames and bell glasses are utilized as may be necessary according to the season and the state of the markets. As one batch of frames and cloches are maturing their crops, beds are being made up for succession crops, so that from one year's end to another there is never a break in the supply of produce.

**Cauliflowers.**—This is a most important crop, and if the heads can be obtained early very good prices may be realized. For the first early crops such varieties as “Express”, Dwarf Early Erfurt (*nain hâtif d'Erfurt*), Early Paris (*tendre de Paris*, or *Petit Salomon*), and Early Snowball (*Boule de Neige*) are chiefly grown. For second-early crops Second-early Paris (*demi-dur de Paris* or *Gros Salomon*) and Lenormand are mostly grown, while a non-catalogued variety called “Driancourt” also finds favour with some growers.

For late crops in the open air it would be difficult to beat Autumn Giant, Walcheren, and Early London or Early Dutch.

The early varieties are sown during the first fortnight in September on an old bed or even in the open border specially prepared; or under lights or cloches if the weather is unfavourable. In due course the seedlings are transplanted as soon as two leaves have been made beyond the seed leaves, and from 150 to 220 are placed under each light, so that one three-light frame may hold from 450 to 660 plants. Plenty of air and light must be given on all favourable occasions, otherwise the plants may grow too quickly and become lanky. Sometimes this happens in spite of every care in very mild winters, and then there is no option but to transplant a second time, putting only half the number of plants under each light, or about a dozen under each cloche. In severe weather the frames and cloches must be covered with mats, and manure must be heaped round the frames, while leaves and litter are also placed around the cloches when the frost is very severe.

Early in December the plants will be ready for placing on the north and south edges of the hotbeds which have already produced a crop of



Crêpe Cabbage Lettuces, and Radishes, and are maturing a crop of Carrots. Six Cauliflowers are placed in each light, three at the top (north) and three at the bottom (south), while an extra one is placed at each end of the frame. The temperature at this time is from 65° to 75° F. The first heads are fit to cut about the third week in March, and the first crop of Cauliflowers is finished about the end of April.

While this particular crop has been maturing, succession crops have been planted at intervals of about a fortnight in other frames in precisely the same way, so that the Cauliflower season is greatly extended.

The second early varieties may be sown at the same time as the first early ones, and treated in the same way to produce heads in natural succession. And in February and March and April a sowing may be made of the later varieties to produce plants for the open ground in May and June, to come into successional bearing in autumn.

Cauliflowers are not only grown in the frames in the way mentioned, but plants are also placed in the spaces between the north and south row of bell glasses that are sheltering Cos Lettuces in early spring.

From the beginning of February onwards Cauliflowers are also planted about 2½ to 3 ft. apart on warm sunny beds or borders on which Radishes and Carrots have just been sown in the same way as under the lights already described. But even the space between the Cauliflowers is not wasted. A Cos Lettuce is planted between every two, while on the margins of the beds or borders a row of Cabbage Lettuces are planted. The diagram will show how this is done.

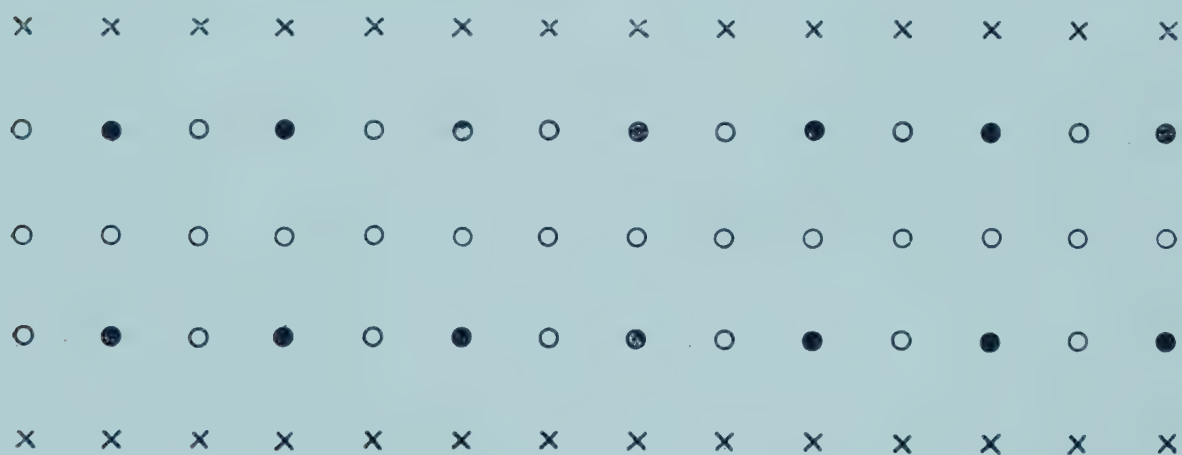


Fig. 527. —Diagram showing how Cauliflowers (●), Cos Lettuces (o), and Cabbage Lettuces (x) are planted on open-air beds

Thus five different crops are on the same piece of ground at one time: (1) Carrots and (2) Radishes (germinating) and (3) Cabbage Lettuces, (4) Cos Lettuce, and (5) Cauliflower. The Radishes come off first, the Cabbage Lettuces second, the Cos Lettuces third, the Carrots fourth, the Cauliflowers fifth, and then the bed can be turned over easily and re-cropped in a similar way, or with whatever crops the grower thinks will pay him best. And this in the open air in early spring. There is nothing like it in British market gardens, and never was.

**Celery.**—For intensive culture such kinds as *Chemin* or *Plein blanc doré* (or Golden Paris) are favoured for early crops, while for succession White Plume (*Plein blanc d'Amérique*) or Pink Plume (*Plein blanc à côtes roses*) are used. The seeds are sown for early crops in January, and for later crops about the middle of March, in a temperature of 60° to 70° F., the young plants being stimulated to make good sturdy growth by careful syringeings, pricking out when large enough, and by proper ventilation. The Celery plants are useful for planting in succession on the exhausted hotbeds in April, May, and June, after such crops as Radishes, Carrots, Lettuces, Cauliflowers, and Turnips have been cleared. The earliest crops of Celery are blanched by placing dry leaves or litter between the plants, and mats are often thrown over the plants (being kept up by a stout board at each side) to hasten the process.

**Corn Salad or Lamb's Lettuce.**—Many English market gardeners grow this crop, but not in the same way as their French brothers. The latter look upon it as an important adjunct to other crops, and frequently sow it broadcast on beds which are afterwards planted with Cos Lettuces, Endives, Cauliflowers, or Cabbages. The "Round-leaved" variety, and the "Large-leaved Italian" or "Regence"; are the Corn Salads or *Mâches* favoured by the French growers. Early in August, or the last week in July, a sowing of Round-leaved Corn Salad is made, and for succession crops other sowings of Regence are made in September and October, as it stands the winter better. The soil should be prepared and well trodden before sowing to yield the best results, and should be thoroughly watered in hot or dry weather, otherwise the crop may fail. According to circumstances, Radishes may sometimes be sown with Corn Salad. In any case the latter is a good crop, coming into use from November onwards at very little expense.



Fig. 528.—Italian Corn Salad (*Valerianella eriocarpa*)

**Cucumbers.**—These are often a good crop in French gardens, such varieties as Telegraph and others being easily cultivated in the frames. The seeds are sown singly in small pots in February or March in the same way as Melons (see p. 222), and the young plants are grown on in practically the same way as that crop during the season, with the exception, however, that several fruits are borne one after another on each plant. The plants also require more water and a more humid atmosphere, and are practically covered with glass throughout the summer months. Ventilation is regulated according to the weather, and a great point is made of thinning out the shoots and pinching them back when the young fruits begin to swell.



**Endive.**—A very important crop in France, and one that should receive more attention in England for salad purposes. There are two distinct kinds—the broad-leaved or Batavian Endives (known to the French as *Scaroles* or *Escaroles*) and the finely cut mossy Endives, known as *Chicorées frisées*. For early work the fine-leaved Italian Chicory (*Chicorée fine d'été*) is greatly favoured and is much grown in frames, and is succeeded by the “Rouen” or Stag’s Horn Endive. For open-air culture there are many fine-leaved varieties used, amongst them being the “Ruffec”, the “Meaux” (or Fine-curved Winter Endive), the “Passion”, and “La Parisienne” (or Winter Queen).

The seeds of the first crops are sown in September and October under cloches, and are pricked out when the seed leaves have well formed. They are afterwards planted in frames from which they are fit to gather in January and February. A succession is kept up by planting at intervals of two or three weeks, and during the summer months Endives are intercropped with Cos and Cabbage Lettuces on beds on which, maybe, Corn Salad, Spinach, Radishes, or Carrots have been sown a day or two before. When the plants are nearly fully grown they are tied up with raffia in the same way as Cos Lettuces, the hearts being thus blanched.

**Lettuces.**—Both Cos and Cabbage varieties are extensively cultivated. The Cos Lettuces are known under the name of *Romaine* in French gardens, to distinguish them from the Cabbage varieties, which are simply called *Laitue*, or Lettuce.

For early frame crops the best Cabbage Lettuces are “The Crêpe”, or “Petite noire”, and these are followed by the “Gotte” (white and black seeded) varieties, including Tom Thumb, Golden Frame (*Jaune d'or*), The George, and the Black-seeded Tom Thumb (*Gotte lente à monter*).

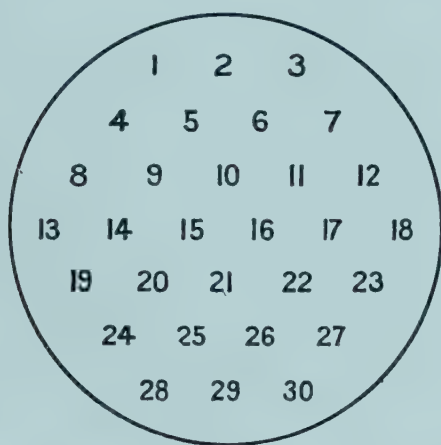
For early outdoor crops such varieties of Cabbage Lettuce as “All the Year Round” (*Blonde d'été* and *Merveille de Quatre Saisons*), Brown Genoa, or Palatine, Giant Summer or Mogul (*Grosse brune paresseuse*), White Stone or Nonpareil (*Grosse blonde paresseuse*), and White-seeded Chavigny (*Blonde de Chavigny*) are chiefly grown; but there are many others according to the taste of the individual growers.

For the winter season one of the best Cabbage Lettuces is the “Passion”, both white and black-seeded varieties, the black-seeded variety having green leaves, while the white has the foliage tinted with red. The black-seeded Passion Lettuce resembles very much the well-known “Stanstead Park” variety so largely grown in English market gardens. Other winter Cabbage Lettuces are Winter White (*Grosse blonde d'hiver*), Hammersmith, or Hardy Winter Green (*Morine*), and Winter Trémont—all good hardy varieties.

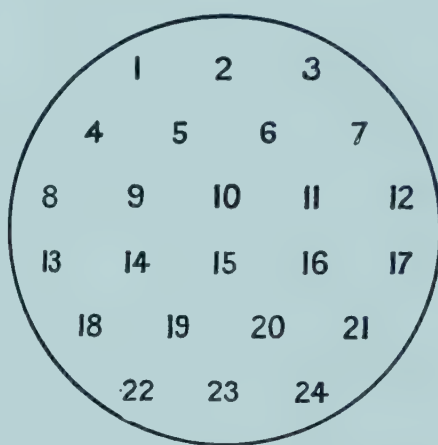
**Cos Lettuces (Romaines).**—Among the best varieties are Dwarf Frame (*Plate à cloches*), Paris White (*Blonde maraîchère*), Paris Market (*Grise maraîchère*), and Paris Green (*Verte maraîchère*)—the two last-named

being useful for open-air crops during the summer and autumn, the others for cloche work in winter and spring.

Seeds of both Cos and Cabbage varieties are sown at the end of August or early in September under cloches, the quantity sown depending of course upon the object in view. This first sowing may be made on nicely prepared soil, or on old hotbeds having plenty of humus and a spongy texture. To define the area for seed-sowing the imprint of a cloche is made as many times on the surface as there are patches to be sown within the circumference. Soon after the seed leaves are well developed the seedlings are carefully transplanted under other cloches on soil already nicely prepared for their reception. Either 2 or 2½ dozen seedlings are thus pricked out under each cloche, as shown in the diagrams.



Two-and-a-half Dozen Seedlings under a Cloche



Two Dozen Seedlings under a Cloche

Fig. 529.—Showing how Seedling Lettuces are Pricked out under Cloches

Here, again, French and English methods are quite dissimilar. The English grower waits until his seedlings have made a few large leaves and have become somewhat drawn by overcrowding. Indeed, he dare not prick out earlier unless he has some close frames and nice soil at hand, as the tender seedlings would never stand the removal to the open ground. The French grower, however, having cloches and frames always at his disposal, as well as a nice soft spongy soil, can transplant the baby plants with impunity, because he can protect them with glass, can keep the air around them sufficiently humid, and can protect them from strong sunshine or frost if need be.

As about 1000 seeds of Lettuce can be sown under each cloche, it is easy to estimate how many little seed beds are to be prepared at any given time.

Another point to be noted is that the French *marâcher* nearly always uses his index finger instead of a dibber for pricking out seedlings, and in this way can dispose of some thousands of plants in one day.

It has already been pointed out that when the frames for Carrots and Radishes have been sown the beds are cropped on the surface with Cabbage Lettuces, these being dwarfer growing than the Cos varieties, and quite near to the glass without actually touching it. About forty-nine



plants (7 by 7) go to each light, and so far as the first early crops, or *primeurs*, are concerned, the main point is to watch the ventilation. The Crêpe, or Petite noire, Lettuces require but very little air, and this is a great advantage before Christmas, when severe frosts often prevail, and it would be a risky proceeding to open the lights too much. The first crops are mature by the end of November and during December, and they may be seen neatly packed in shallow crates in the London markets before Christmas—not always the finest examples, it is true, because those usually go to Paris, Berlin, Amsterdam, and other big Continental cities, where salads are more highly appreciated than they are in England during the cold weather.

The Cos (or Romaine) Lettuces are raised in the same way as the

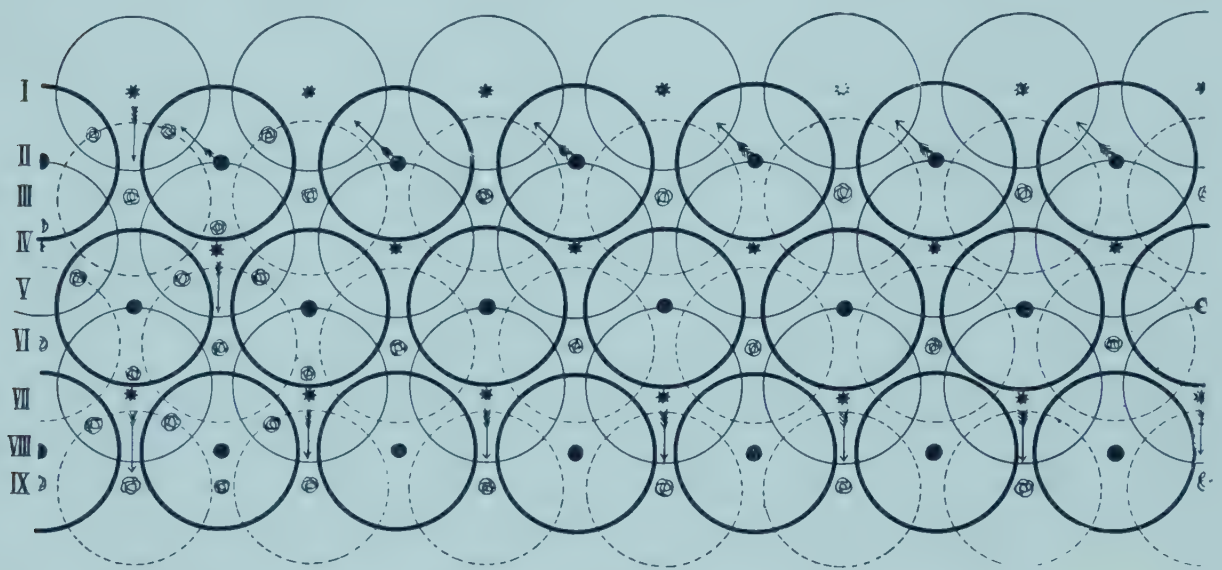


Fig 530.—Diagram illustrating Hotbed and Cloches with Nine Rows of Lettuces

(1) The thick circles show first position, each cloche covering one cos lettuce in the centre, and three cabbage lettuces. (2) The thin circles show second position of cloches, the arrows indicating how they are moved. (3) The dotted circles show third position of cloches moved as indicated by arrows.

Cabbage ones, but are matured under cloches instead of in frames, owing to their height. Under each cloche, however, a sowing of Radishes and Carrots has already been made, as in the frames; then the Cos Lettuce is placed in the centre, and three or four Cabbage Lettuces are placed around it, making four or five Lettuces (as shown in the diagram, fig. 530) and several Radishes and Carrots altogether under one miniature greenhouse having a surface area of  $1\frac{1}{2}$  sq. ft. Each cloche will therefore yield, three or four Cabbage Lettuces, one Cos Lettuce, about five bunches of early Radishes, and three or four bunches of early Carrots, altogether worth from 2s. to 2s. 6d. And this system of cropping is repeated about three times between October and the end of April and May. If prices are good one can realize that the business is a lucrative one, notwithstanding the expense of manure.

About February, when the weather is getting warmer, the spaces between the cloches are utilized for other Cos Lettuces. As shown in the diagram, six rows are planted, each row of cloches being flanked with two

rows of Cos Lettuce, making (with the three rows under the cloches) nine rows altogether on one bed  $4\frac{1}{2}$  ft. wide. It is obvious that the Cos Lettuces under the cloches, being warmer and more comfortable, are growing at a more rapid rate than the others, and will therefore come to maturity sooner. This is what actually happens, and in March the Cos Lettuces under the cloches are cleared for sale. Two things immediately follow this operation. First, the cloches thus freed are placed over three other rows of Cos Lettuces, and the spaces left vacant by the departure of the first crop are once again filled with young plants, thus still keeping up the nine rows to the bed.

Moving the cloches from Crop No. 1 to Crop No. 2, although a simple matter to the *marai cher*, is a somewhat puzzling proceeding to the novice. The arrows indicate the way in which the cloches should be moved—in a north-westerly direction, it will be observed. In the first place, however, the cloche at the extreme north-west corner must be taken away altogether, and placed at the extreme south-east end of the bed. With one cloche missing it is thus a simple matter to move the others one after another over the second crop of Lettuces in the way shown in the diagram, the cloche taken away at first being, of course, available for the last plant in the bed.

About a fortnight after this movement of cloches the Cos Lettuces beneath them will naturally have grown more quickly than those exposed. They will then be fit to pull, and another movement of cloches and another replanting will take place. This time, however, the cloches will be moved due south, over Crop No. 3, as shown by the arrows in the diagram. This ingenious system of protecting one crop of Lettuces after another with the same bell glasses goes on until the end of April or May, when there is no longer any necessity for protection.

From this period and throughout the summer months the Lettuces are grown in precisely the same way, cropping and intercropping proceeding with regularity. But the plants are not left to the tender mercies of the weather as in British market gardens. They are watered every day (except when a heavy rain falls), and during the summer months, when the thermometer registers  $80^{\circ}$  and more in the shade, perhaps the plants will be watered in the afternoons as well as in the mornings. The beautiful dark spongy mould drinks the water up readily, and notwithstanding the great evaporation of moisture from the plants themselves, and from the surface of the soil, there is an abundance of humidity, which with the heat causes the crops to grow with extraordinary rapidity. Thus the gardener is kept constantly at work marketing one crop, and immediately filling its place with another as fast as he can go. Why cannot this open-air system of cultivation be practised on an acre or two in British market gardens during the summertime at least? It would pay much better than having 5, 10, or 15 ac. under Lettuce, and losing half the plants by lack of cultivation. In the course of twelve months a French *marai cher* must clear something like a quarter of a million Lettuces off 1 ac. of ground, to say



nothing of the Radishes, Carrots, Spinach, Corn Salad, &c., he obtains betweenwhiles.

There is only one trouble in Lettuce growing in frames and under cloches, and that is mildew. During the winter season this is sometimes troublesome, and is caused by a fungus called *Peronospora gangliiformis*. Should the white frosty-looking mildew appear, any plants badly affected are carefully taken up and burned; slight attacks are kept under by dusting flowers of sulphur over the plants and soil, or by watering with a solution of sulphate of copper—1 oz. to 100 pt. of water. Slugs are kept down by dressing with powdered lime or soot. Cockchafer grubs, when troublesome at the roots, cause the leaves to wilt; they are then searched out with the finger and destroyed. Wireworm grubs are trapped with pieces of potato or carrot. As a rule, however, owing to the constant turning over of the soil, these insect pests are not allowed to become too troublesome.

**Melons.**—While the Carrots, Radishes, Lettuces, Cauliflowers, and Turnips in the early part of the year are relied upon to fill the coffers of the *marâtcher*, Melons fulfil the same function during the summer months when the others fetch only low prices. Two varieties of Canteloupe Melon are grown, namely, the “Early Frame Prescott” (*Prescott hâtif à chassis*) and the *Prescott fond blanc*. A silvery variety (*argenté*) is also grown, and another called *Prescott fond gris*. These all have roundish, irregular, somewhat ribbed and depressed fruits 1 ft. or more in diameter, the skin being mottled with shades of grey, green, and white, changing to yellowish brown when nearing maturity. Only one fruit is allowed to ripen on each plant, and if a supply can be obtained in Paris early in June the prices range from 25 to 50 francs each—roughly, 20s. to 40s. per fruit. By the end of the season, however, in August, the fruits will realize only from 3 to 5 or 6 francs; but much depends upon the weather and the law of supply and demand.

The method of culture is as follows. The seeds, which cost about 6d. per 100, are sown singly in small pots in February and March. The pots are plunged up to the rims in a deep hotbed in which a temperature of 75° to 80° F. can be maintained, by lining or banking up the frames with fresh manure when rendered necessary by the weather. The frames are covered with mats during the night, but these are taken off as soon as possible in the morning after the seed leaves have appeared. Melon seeds are also sown in hotbeds in a finely prepared compost, being placed about 1 in. apart and a couple of inches deep in shallow drills 2 or 3 in. apart. The seedlings are either potted on once into 3-in. pots, or are transplanted 4 to 5 in. apart in other frames with hotbeds. They are shaded from strong sunshine and kept moist overhead until well established. Then plenty of light and a fair amount of air are permitted to make the plants strong and sturdy, and watering is done with care. When the plants have developed three or four rough leaves beyond the seed leaves, the stem is pinched off an inch or more above the second





Photo. *Daily Mirror*

### A LECTURE ON FRENCH GARDENING

At the Exhibition by the Royal Botanic Society in Regent's Park, 1910



Photo. Chas. L. Clarke

### CANTELOUPE MELONS IN FRAMES AT THATCHAM

Under the French Intensive System





leaf, and the seed leaves themselves are also suppressed. Still more air—but not too much—and plenty of light are given after this pinching operation, but sprinklings are carefully regulated, as too much moisture would be injurious at this time.

As soon as two side shoots have developed from the main stem, as the result of pinching, the young Melons are ready to be planted in the frames. In these the old soil is taken out 2 ft. wide and 1 ft. deep along the centre from one end of the range to the other. The trench thus made is then filled up with two-thirds fresh and one-third old manure well mixed and trodden down. The soil from the second range of frames is then taken out 2 ft. wide and 1 ft. deep (as in the first range), and is spread over the newly made hotbed in Range No. 1. When the hotbed in Range No. 3 is made in the same way, the soil from Range No. 4 is placed on it, and so on till all the ranges necessary for Melon growing have been finished.

The hotbeds having been prepared in the way indicated and the heat

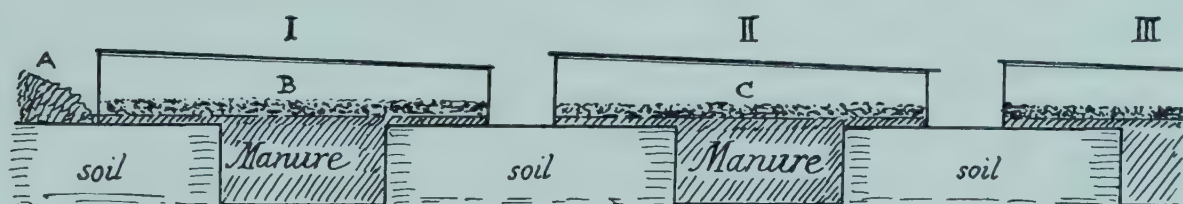


Fig. 531.—Diagram showing how Hotbeds are made for growing Canteloupe Melons

A, Soil taken from trench in frame No. I to be replaced with manure. B, Soil taken from trench in frame No. II to spread over manure in No. I. C, Soil from No. III for No. II, and so on.

having subsided to 80° or 75° F., two or three plants are placed under each light. Two or three holes are scooped out in the centre for the reception of the plants. The soil is packed carefully and firmly round the roots, a gentle watering is given, the lights are closed and shaded from the sun for three or four days, by which time the plants will have become established in their new quarters. Afterwards air is given each day according to the state of the weather, the lights being tilted right up on hot days, but only very slightly on cold draughty days. Water must be given more or less freely according to the growth and the weather.

An important feature in Canteloupe Melon growing is the pinching of the main and side shoots. The plants being placed in the centre with one shoot pointing to the top, or north, and the other to the bottom, or south, side, the tips are pinched out when the shoots reach the limit. Side shoots are developed in due course, and when about 1 ft. long they are pinched back an inch or so above the third, fourth, or fifth leaf. Any other shoots developing afterwards are treated in the same way.

In the meantime the blossoms—male and female—have appeared, but the first batch is usually suppressed until the plants are well established. Afterwards the best female flowers are selected and fertilized with pollen from the male blooms, and the young fruits begin to swell. When about



as large as a small hen's egg all the fruits except the two best are suppressed. Later on, when these two are about as large as cricket balls, the grower decides which is the better of the two, and then suppresses the other, so that each plant eventually ripens only one fruit. It is considered better to have one large, fine fruit than to have two or more smaller ones. Throughout the entire period of growth, watering and ventilation are judiciously regulated, watering always being done before ten o'clock in the morning. In due course the fruits begin to ripen. This is known by the change of colour in the skin and by the aroma. The fruits are then cut and are placed in a cool, dark, airy place to ripen slowly. If left too long on the plants they may ripen too suddenly, and be unfit for market.

The worst diseases of Melons are a fungoid disease, called *nuile* in French gardens, brought about by *Scolecotrichum melophthorum* in cold, wet, and erratic seasons. To avoid it the plants must be kept warm and free from cold draughts, and great care must be taken not to overwater and make the atmosphere too humid. Flowers of sulphur may be dredged about the plants as a preventive and check. Canker also attacks Melons occasionally. The injured portions are best cut away, afterwards dressing the wounds with powdered lime or wood ashes.

Besides the Canteloupe varieties mentioned, a smaller variety known as "Chypre" or "Kroumir" is sometimes grown. The seeds are sown early in April, and the plants are grown on in the same way as the Canteloupes, but are placed under cloches instead of lights. About the end of May or during June they require no protection, except perhaps over the centre. The plants are stopped and pinched, and the first fruits will be ripe early in August if not sooner.

The plate shows a portion of a range of Canteloupe Melons in full bearing. It will be noticed that only three fruits are allowed to each light (one to each plant), and the size of each can be judged in comparison with the lady's hat, which is by no means small.

**Radishes.**—These constitute an easily grown and lucrative crop either when grown in frames during the winter months or in the open air in spring, summer, and autumn. For early frame culture the Turnip-shaped or Round Red varieties are favoured, the "Forcing Scarlet" being one of the best. The first sowing may be made in September, on warm sheltered beds sloping towards the south, to produce a crop about the end of November or early December. If the weather is unfavourable, it may be necessary to cover at night with mats or litter.

In November and December Radishes are also sown in frames in which Carrots have already been sown and in which Lettuces are to be planted, and as range after range is cleared of the crops, so Radishes may be sown again beneath or between the Lettuces and over the Carrots until February and March. At the end of January and onwards, Radishes are also sown in the open borders, but the same system of over and under-cropping is carried on. The growth naturally is slower than under the

frames and cloches, but the crops are successive and continuous throughout the summer and autumn months. Owing to the abundance of water and the beautiful mould, Radishes as grown in French gardens are tender and delicate in flavour, and are never allowed to become overgrown, spongy, and rank in flavour. Besides the Early Forcing varieties, others like the French Breakfast, the Half Long Scarlet, white-tipped, and others may be grown. The first early crops or *primeurs*, done up in bunches of a dozen, often realize 1*d.* and 2*d.* per bunch (1*s.* to 2*s.* per dozen bunches), each containing twelve Radishes. Open-air bunches, however, have from three dozen to four dozen Radishes in them for the same money later on.

**Spinach.**—This is still an important crop to the French *marâcher*, but is not grown so much in frames now as formerly. The seeds of a variety like “Monstrous Viroflay” is sown on prepared beds about August to produce leaves in September; but a crop of Cos Lettuce, or Endive will have been planted over the surface immediately after sowing; or the Spinach may be sown between a crop already standing, but only half-grown. In October such varieties as “Flanders” or “Prickly Longstanding” may be sown for winter work, and some of these plants may be taken up in February or early March, have the leaves cut off, and then be planted in frames between a crop of Gotte Lettuces after a crop of Radishes have been cleared, and while the Carrots beneath are only just showing through the soil. Spinach grown in frames in this way produces beautiful leaves fit for picking about three weeks after planting. The entire plant, however, is pulled, so as to leave room for the Carrots. From the middle of February until the end of July or middle of August a sowing of Spinach may be made on the beds, between or under other crops, at intervals of two or three weeks, so that a supply is kept up all the year round. With plenty of water there is little danger of the plants running to seed even in the hottest summer.

**Turnips.**—The variety most in favour for frame work in French gardens is the “Marteau” or “Half-long White Forcing”, but others may be grown if considered sufficiently remunerative. The seeds are sown early in January on a hotbed with a temperature of 70° to 80° F., the surface being covered with fine spongy mould passed through a sieve. The seeds are not sown broadcast or in drills. Small holes about 1 in. deep and 6 in. apart are made with the index finger, and two or three seeds are dropped into them. The surface is levelled over with a piece of batten and nicely watered, and the lights are covered with mats for four or five days, until the seed leaves appear. After a few days the seedlings are thinned out, so as to leave only one plant to each little hole. About the middle of February this first crop of Turnips will be advanced enough and sufficiently hardy to allow the lights to be taken away to place over a second sowing in other frames. In the event of frost, mats must be placed over the plants at night. By making a sowing of “Marteau” Turnips in January, February, March, and April, four crops can be taken off the beds by the



middle of May or thereabouts, using only two different sets of beds and one set of lights. Crop No. 3 will be sown on the same bed as Crop No. 1, and Crop No. 4 will occupy the beds from which Crop No. 2 has been cleared.

Besides the plants mentioned above, others are sometimes grown as catch crops in French gardens. For instance, Strawberries may be brought into earlier maturity by being covered with cloches, and Tomatoes and Marrows are protected early in the year. Egg plants (Aubergines) are also grown, and Seakale, Chicory, and Asparagus are forced in the hot-beds when necessary, while Dwarf Beans were at one time an important crop. Leeks, Onions, Sorrel, and Cabbages are also grown when considered remunerative, and even Dandelions are not despised. The cloches and frames, however, are chiefly used for the most remunerative crops, like Radishes, Carrots, Cauliflowers, Lettuces, Endives, and Melons. There is no reason, however, why early Potatoes, Mint, Violets, Christmas Roses, Tulips, and many other dwarf early-flowering plants might not be grown under the system under carefully-thought-out conditions. The reader will find much more detailed information in *French Market Gardening* (London, John Murray, 1909).

[J. W.]

# INDEX

## A

- Aaron's Beard, ii 96.  
 Abele Poplar, iv 33.  
 Abies, iv 59.  
 Abraxas grossulariata, i 185; iii 157.  
 Absorption of dew, i 107.  
 Abutilon, ii 122.  
 Acacia, ii 122.  
 Acacia, False, iv 38.  
 Acæna, ii 1.  
 Acalypha, ii 123.  
 Acantholimon, ii 2.  
 Acanthopanax ricinifolium, iv 5.  
 Acanthophœnix crinita, ii 194.  
 Acanthophœnix rubra, ii 194.  
 Acanthus, ii 2.  
 Accounts, market-garden, iii 228.  
 Acer, i 14; iv 2.  
 Achillea, ii 2.  
 Achimenes, ii 124.  
 Acidia heraclei, i 178; iv 100.  
 Aconite, Winter, ii 39.  
 Aconitum, ii 2.  
 Acorus, ii 13.  
 Acre of soil, food from, i 144.  
 Acroclinium roseum, ii 42.  
 Acrostichum, ii 222.  
 Actæa, ii 3.  
 Actinopteris, ii 223.  
 Adiantum, ii 223; pinnule and sori, ii 212.  
 Adonis, ii 3.  
 Advantages of humus, i 94; lime, i 93; clay, i 92; sand, i 92; peat, i 94.  
 Æsculus, iv 3.  
 Æthionema, ii 3.  
 Afforestation, i 11.  
 Agapanthus, ii 124.  
 Agathæa, ii 124.  
 Agave, ii 124.  
 Ageratum, ii 125.  
 Agreement, fruit - growing, iii 13.  
 Agricultural Holdings Acts, iii 10.  
 Agricultural Rates Act, iii 7.  
 Agriotis lineatus, i 193.  
 Agrostemma cœli-rosa, ii 68.  
 Agrostis nebulosa, ii 50.  
 Agrotis exclamationis, i 181.  
 Agrotis segetum, i 181.  
 Ailanthus, iv 4.  
 Aira flexuosa, ii 50.  
 Air-pipes, i 237.  
 Ajuga, ii 3.  
 Alchemilla, ii 4.  
 Alder, iv 4.  
 Alexandrian Laurel, i 41; iv 49.  
 Aleyrodes proletella, i 177.  
 Aleyrodes vaporariorum, i 190.  
 Algæ, i 27.  
 Alisma, ii 13.  
 Allamanda, ii 125.  
 Alliaceous crops, iv 72.  
 Allium, ii 4.  
 Allium ascalonicum, iv 162.  
 Allium Cepa, iv 124.  
 Allium Porrum, iv 112.  
 Allium sativum, iv 193.  
 Allium Schœnoprasum, iv 190.  
 Allspice, Carolina, iv 10.  
 Almond, iv 5.  
 Alnus, iv 4.  
 Alocasia, ii 125.  
 Aloe, ii 125.  
 Aloysia, ii 125.  
 Alpine plants, ii 93.  
 Alpinia, ii 125.  
 Alsophila, ii 223.  
 Alstroemeria, ii 4.  
 Alternanthera, ii 126.  
 Althæa frutex, iv 24.  
 Althæa rosea, ii 54.  
 Alyssum, ii 4.  
 Amaranthus, ii 5.  
 Amaryllis, ii 5.  
 Amberboa moschata, ii 108.  
 Amberboa odorata, ii 108.  
 Amelanchier, iv 4.  
 American Aloe, ii 124.  
 American Azalea, iv 6.  
 American Blackberry, iii 163.  
 American blight, i 173; iii 81.  
 American Cowslips, ii 37.  
 American gooseberry mildew, iii 147.  
 " American " plants, iv 1.  
 Ammobium alatum, ii 42.  
 Ammoniacal copper fungicide, i 212.  
 Ammonium salts, i 128.  
 Ampelopsis, iv 56.  
 Amygdalus, iv 5.  
 Amygdalus persica, iii 131.  
 Analysis book, iii 234.  
 Analysis of fruits, i 109; fruit soil, iii 4; vegetables, i 109; soils, i 97, 110, 111.  
 Anbury, i 209.  
 Anchusa, ii 5.  
 Andromeda, iv 5.  
 Androsace, ii 6.  
 Anemia, ii 224.  
 Anemone, ii 6.  
 Anemone, Wood, ii 7.  
 Anethum graveolens, iv 191.  
 Angelica, iv 186.  
 Angiopteris, ii 224.  
 Anguillulidæ, iii 171.  
 Anisopteryx æscularia, i 185.  
 ANNUALS AND BIENNIALS, *see vol. ii under—*  
 Amaranthus, Bartonina,  
 Calendula, Callirhoe,  
 Callistephus, Campanula,  
 Candytuft, Canterbury  
 Bell, Carnation, Centaurea,  
 China Aster, Chrysanthemum,  
 Clarkia, Collinsia,  
 Convolvulus, Coreopsis,  
 Cosmos, Eschscholtzia,  
 Everlastings, Foxglove,  
 Gilia, Godetia, Gypsophila,  
 Heracleum, Hibiscus,  
 Honesty, Kaulfussia, Linum,  
 Lupinus, Malope,  
 Marigold, Mignonette, Nasturtium,  
 Nemophila, Nicotiana,  
 Nigella, Nolana,  
 Nycterinia, Papaver, Perilla,  
 Phlox, Platystemon,  
 Pyrethrum, Ricinus, Salpiglossis,  
 Saponaria, Scabiosa,  
 Schizanthus, Schizopetalon,  
 Senecio, Sidalcea,  
 Silene, Snapdragon, Statice,  
 Stock, Sunflower, Sweet Pea,  
 Sweet Sultan, Sweet William,  
 Ursinea, Venidium,  
 Waitzia, Wallflowers, Zinnia.



Antennaria, ii 7.  
 Anthemis, ii 7.  
 Anthemis nobilis, iv 187.  
 Anthericum, ii 7.  
 Antheridia of Ferns, ii 214.  
 Anthomyia Betæ, i 174.  
 Anthomyia Brassicæ, i 177.  
 Anthomyia Ceparum, i 186.  
 Anthomyia Lactuæ, i 185.  
 Anthonomus pomorum, i 174; iii 80.  
 Anthoxanthum odoratum, ii 50.  
 Anthracnose of Vine, iii 201.  
 Anthriscus Cerefolium, iv 189.  
 Anthurium, ii 126.  
 Antirrhinum, ii 7.  
 Antirrhinum majus, ii 100.  
 Ants, i 173.  
 Apelenchus fragariæ, iii 171.  
 Apera arundinacea, ii 50.  
 Aphides, i 173.  
 Aphides, Apple, iii 82.  
 Aphis amygdali, i 186.  
 Aphis, Apple, i 173.  
 Aphis, Black, i 174.  
 Aphis brassicæ, i 177.  
 Aphis, Cabbage, i 177.  
 Aphis, Cherry, i 178.  
 Aphis cratægaria, i 182.  
 Aphis, Currant, i 181.  
 Aphis dauci, i 177.  
 Aphis mali, i 173.  
 Aphis, Peach, i 186.  
 Aphis, Plum, i 189; iii 114.  
 Aphis, Rose, i 190.  
 Aphis rumicis, i 174.  
 Aphis, Woolly, i 194; iii 81.  
 Aphis, Yellow, i 194.  
 Aphrophora spumaria, i 190.  
 Apis mellifica, i 197.  
 Aponogeton, ii 7.  
 Apospory in Ferns, ii 215.  
 Apple Aphis, i 173; iii 82.  
 Apple bitter-pit, iii 90.  
 Apple bitter-rot, i 206.  
 Apple black-rot, i 205.  
 Apple blight, i 205.  
 Apple-blossom Weevil, i 174; iii 80.  
 Apple canker, i 205; iii 88.  
 Apple Clearwing Moth, i 174.  
 Apple, diseases of the, iii 84.  
 Apple-fruit, analysis of, i 109.  
 Apple, insect pests of the, iii 75.  
 Apple mussel scale, i 174; iii 81.  
 Apple Pith Moth, i 174.  
 Apple powdery mildew, 205.  
 Apple ripe rot, i 205.  
 Apple rot, iii 87.  
 Apple rust, i 206.  
 Apple Sawfly, i 174; iii 80.  
 Apple scab, i 206; iii 84.  
 Apple Sucker, i 173; iii 83.  
 Apple Sucker wash, i 214.

Apple-growing at Evesham, iii 29.  
 Apple-growing, expenses, etc. iii 61.  
 Apple tree, composition of, i 143.  
 Apple-tree heartwood rot, iii 90.  
 Apple-tree mildew, iii 90.  
 Apple-tree stocks, iii 21.  
 Apples, iii 57; area under cultivation, iii 58; culinary, iii 68; dessert, iii 71; storing, iii 64; varieties to plant, iii 66; and mixed crops, iii 60; and Rhubarb, iii 61.  
 Apricots, iii 142.  
 Aquatic plants, ii 13.  
 Aquilegia, ii 8.  
 Arabis, ii 8.  
 Aralia, ii 126.  
 Aralia chinensis, iv 5.  
 Aralia Sieboldi, ii 127.  
 Araucaria, i 55; ii 127.  
 Araucaria imbricata, iv 60.  
 Arbor-Vitæ, iv 64.  
 Arbutus, iv 6.  
 Archangel mats, i 37.  
 Archegonia of Ferns, ii 214.  
 Archontophoenix Cunninghami, ii 194.  
 Ardisia, ii 127.  
 Areca, ii 192.  
 Areca Verschaffelti, ii 194.  
 Arenaria, ii 9.  
 Aristolochia, ii 128.  
 Armadilla vulgaris, i 194.  
 Armeria, ii 9.  
 Arnebia, ii 9.  
 Arsenate of lead, i 212.  
 Artemisia, ii 9.  
 Artemisia Abrotanum, iv 199.  
 Artemisia Absinthium, iv 202.  
 Artemisia Dracunculus, iv 200.  
 Artichoke, Chinese, iv 74.  
 Artichoke, Globe, iv 73.  
 Artichoke, Jerusalem, iv 72.  
 Artocarpus Canoni, ii 169.  
 Arum, ii 9.  
 Arum Lilies, ii 128.  
 Arundinaria, iv 7.  
 Arundo, ii 10.  
 Asclepias, ii 10.  
 Ascochyta juglandis, iii 208.  
 Ash, iv 22.  
 Ash analyses, i 109.  
 Ash, Mountain, iv 34.  
 Ashes, wood, i 158.  
 Asparagus, iv 75; at Evesham, iv 79; grading and marketing, iv 77.  
 Asparagus Beetle, i 174; iv 80.  
 Asparagus Fly, i 174.  
 Asparagus, forcing, iv 77.  
 Asparagus plumosus, ii 129.  
 Asparagus rust, i 208.

Asparagus Sprengeri, ii 129.  
 Aspects of commercial gardening, i 1.  
 Aspen, iv 33.  
 Asperula, ii 10.  
 Asphodelus, ii 10.  
 Aspidistra, ii 130.  
 Aspidium, ii 224; pinnule and sori, ii 212.  
 Asplenium, ii 225; pinnule and sori, ii 212.  
 Assimilation, i 44.  
 Aster, ii 10.  
 Aster, China, ii 19.  
 Aster sinensis, ii 14.  
 Astilbe, ii 11.  
 Astrantia, ii 11.  
 Athalia spinarum, i 193.  
 Atlas Cedar, iv 60.  
 Atriplex hortensis, iv 196.  
 Aubergines, ii 206; iv 192.  
 Aubrietia, ii 11.  
 Aucuba, iv 6.  
 Auricula, ii 11.  
 Austrian Pine, iv 62.  
 Ayrshire Roses, iv 39.  
 Azalea indica, ii 130.  
 Azalea, Ghent, etc., iv 6.  
 Azara, iv 7.  
 Azotobacter, i 127.

## B

Bachelor's Buttons, white, ii 92.  
 Bacillus phythophthorus, i 210.  
 Bacillus radicola, i 127.  
 Bacteria in the soil, i 126.  
 Balance Sheets, iii 238.  
 Balaninus nucum, i 186; iii 206.  
 Balm, iv 186.  
 Balsam Poplar, iv 33.  
 Balsams, ii 133.  
 Bamboo, iv 7.  
 Bambusa, iv 7.  
 Baneberry, ii 3.  
 Banksian Rose, iv 39.  
 Barbados Cedar, ii 177.  
 Barbe de capucin, iv 189.  
 Barberry, iv 8.  
 Bark, i 37.  
 Bartonina, ii 12.  
 Basic slag, i 157.  
 Basil, Sweet, iv 186.  
 Baskets, non-returnable, iii 55.  
 Basswood, iv 54.  
 Bast, hard, i 37.  
 Bastard trenching, cost of, ii 18.  
 Bay Tree, Sweet, iv 27.  
 Bead Plant, ii 74.  
 Beam Tree, white, iv 34.  
 Bean beetles, i 174.  
 Bean, Broad, iv 81.  
 Bean, Dwarf, iv 84.  
 Bean, French, iv 84.

- Bean, French climbing, iv 85.  
 Bean, Indian, iv 11.  
 Bean, Kidney, iv 84.  
 Bean, Kidney, Disease, i 208.  
 Bean, Runner, iv 82.  
 Bean rust, i 208.  
 Bear's Breech, ii 2.  
 Bee, Honey, i 197.  
 Bee, Humble, i 197.  
 Beech, iv 22.  
 Beech Fern, ii 231.  
 Beet Carrion Beetle, i 174.  
 Beet Fly, i 174.  
 Beet heart-rot, i 209.  
 Beetroot, iv 85.  
 Begonia, ii 133.  
 Begonia, fibrous-rooted, i 135.  
 Begonia, Gloire de Lorraine, ii 135.  
 Begonia, propagation of, i 77; ii 134.  
 Begonia, Tuberous, ii 133.  
 Begonia, Winter-flowering, ii 136.  
 Belladonna Lily, ii 5.  
 Bellis, ii 12.  
 Belvedere, ii 62.  
 Benthamia japonica, iv 18.  
 Berberidopsis, iv 8.  
 Berberis, iv 8.  
 Bergamot, ii 72.  
 Bermuda Cedar, ii 177.  
 Berry, i 67.  
 Bertolonia, ii 137.  
 Beta vulgaris, iv 85.  
 Betula, iv 9.  
 Big-bud of Currants, iii 157.  
 Bignonia, ii 137.  
 Bignonia radicans, iv 53.  
 Bilberry, iv 54.  
 Biota orientalis, iv 65.  
 Birch, iv 9.  
 Birds and Cherries, iii 131.  
 Bird's-eye Maple, iv 3.  
 Bird's-eye rot, i 206.  
 Bird's Nest Fern, ii 226.  
 Bitter Almond, iv 5.  
 Bitter-pit of Apples, iii 90.  
 Bitter-pit, loss by, iii 87.  
 Black Aphis, i 174.  
 "Black Apples," iii 86.  
 Blackberry, iii 163; iv 49.  
 Blackberry, American, iii 163.  
 Black blotch of Tomatoes, iv 181.  
 Black Dolphin, i 174.  
 Black knot of Gooseberries, iii 152.  
 Black or Vine Weevil, i 174.  
 Black rot of Vine, iii 201.  
 Black scab of Potatoes, iv 153.  
 Black stripe of Tomatoes, iv 180.  
 Blackthorn, iv 34.  
 Bladder Nut, iv 51.  
 Bladder Senna, iv 17.  
 Blairgowrie, Fruit-growing at, iii 35.  
 Blastodacna vinolentella, iii 79.  
 Blastophaga grossorum, iii 174.  
 Blatta orientalis, i 178.  
 Blechnum, ii 226.  
 Bleeding, i 55.  
 Bleeding Heart, ii 36.  
 Blood manures, i 152.  
 Blood Root, ii 95.  
 Bluebell, New Zealand, ii 118.  
 Bluebells, ii 12.  
 Blueberry, iv 54.  
 Blue Copperas, i 214.  
 Blue Gum Tree, ii 168.  
 Blue Marguerite, ii 124.  
 Blue Spruce, iv 62.  
 Bluestone, i 214.  
 Blue Vitriol, i 214.  
 Bocconia, ii 12.  
 Bog and water plants, ii 13.  
 Boilers for greenhouses, i 232; sectional, i 234; setting, i 234.  
 Bombus terrestris, i 197.  
 Bone manures, i 156.  
 Boning Rods, iii 217.  
 Books, Account, iii 233; Analysis, iii 234; Market, iii 233; Loose-leaf, iii 234; Field, iii 216; Sales, iii 235, 236.  
 Borage, iv 187.  
 Borago officinalis, iv 187.  
 Bordeaux Mixture, i 213; ii 49; modified, iii 50.  
 Borecole, iv 86.  
 Boronia, ii 137.  
 Boston Fern, ii 229.  
 Botrytis cinerea, i 206; iii 178, 201.  
 Bottle grafting, i 88.  
 Bougainvillea, ii 138.  
 Bouncing Bet, ii 95.  
 Bouquets, i 10.  
 Bouvardia, ii 138.  
 Box, iv 9.  
 Box Elder, iv 3.  
 Bracts, i 49.  
 Brahea edulis, ii 194.  
 Brainea, ii 226.  
 Bramble, iv 49.  
 Branching, i 55.  
 Brandy Bottle, ii 120.  
 Brassica Botrytis asparagoides, iv 87.  
 Brassica bullata gemmifera, iv 88.  
 Brassica campestris Rutabaga, iv 181.  
 Brassica Caulo-rapa, iv 111.  
 Brassica crops, iv 72.  
 Brassica Napus, iv 195.  
 Brassica oleracea, iv 89.  
 Brassica Rapa, iv 181.  
 Brassy Onion Fly, i 186.  
 Brevoortia, ii 14.  
 Briar, Austrian, iv 39.  
 Briar Rose, Sweet, iv 39.  
 Brier stocks, iv 42.  
 Briza maxima, ii 50.  
 Broad Bean, iv 81.  
 Broccoli, iv 87.  
 Brodiaea, ii 14.  
 Brome Grass, ii 50.  
 Bromeliads, ii 139.  
 Brompton Stock, ii 103.  
 Bromus brizæformis, ii 50.  
 Broom, iv 19.  
 Broom, Mount Etna, iv 23.  
 Broom, Spanish, iv 50.  
 Brown fruit rot, iii 86.  
 Brown-tail Moth, i 177; iii 78.  
 Bruchus flavimanus, i 174.  
 Bruchus granarius, i 174.  
 Bruchus rufimanus, i 174.  
 Brugmansia, ii 165.  
 Brunfelsia, ii 139.  
 Brussels Sprouts, iv 88.  
 Bryobia nobilis, iii 146.  
 Bryophyllum calycinum, i 59.  
 Buck Eye, iv 3.  
 Buckler Fern, Broad, ii 228.  
 Buckler Fern, Marsh, ii 228.  
 Buckler Fern, Mountain, ii 228.  
 Buckthorn, iv 36.  
 Budding, i 83.  
 Buddleia, iv 9.  
 Bugle, ii 3.  
 Bulbils, i 39.  
 Bulbils, propagation by, i 82.  
 Bulbinella Hookeri, ii 22.  
 Bulb mite, i 177.  
 Bulbocodium, ii 14.  
 Bulbous Crops, iv 72.  
 Bulbous Irises, ii 39.  
 BULBOUS PLANTS, *see vol. ii under—*  
     Amaryllis, Bluebells, Brevoortia, Brodiaea, Bulbocodium, Calochortus, Chionodoxa, Crinum, Crocus, Daffodil, Eucharis, Eucomis, Freesia, Fritillaria, Galanthus, Galtonia, Gladiolus, Hippeastrum, Hyacinth, Iris, Ixia, Lachenalia, Leucojum, Lilium, Lycoris, Narcissus, Nerine, Scilla, Tigridia, Tulip, Val-lota.  
 Bulbs, i 39.  
 Bulb Trade, The, i 3.  
 Bullaces, iii 119.  
 Buphthalmum, ii 14.  
 Burgundy mixture, i 214; iv 151.  
 Burnet, iv 187.  
 Burning Bush, ii 36.  
 Bush Apple-trees, iii 61.  
 Bush Fruits, iii 143.  
 Bush Marrows, iv 184.  
 Butcher's Broom, i 41; iv 49.  
 Butomus, ii 13.  
 Buttercup, ii 92.  
 Buxus, iv 9.  
 Byturus tomentosus i 189; iii 161.



## C

- Cabbage Aphis, i 177.  
 Cabbage black rot, i 209.  
 Cabbage, Broccoli, iv 88.  
 Cabbage Butterfly, i 177.  
 Cabbage Crops, iv 72.  
 Cabbage, Diseases of, i 209.  
 Cabbage Gall Weevil, i 177; iv 183.  
 Cabbage Moth, i 177.  
 Cabbage Palm, ii 194.  
 Cabbage Powdered Wing Fly, i 177.  
 Cabbage, Red, iv 92.  
 Cabbage, Savoy, iv 93.  
 Cabbage, under glass, iv 93.  
 Cabbage white rust, i 208.  
 Cabbages, iv 89.  
 Cacti, ii 139.  
 Caladium, ii 142.  
 Calamintha, ii 14.  
 Calamus ciliaris, ii 194.  
 Calandrinia, ii 14.  
 Calathea, ii 142.  
 Calcareous manures, i 159.  
 Calceolaria, ii 142.  
 Calceolaria, herbaceous, ii 143.  
 Calcium carbonate, i 93, 135; cyanamide, i 156; sulphate, i 161.  
 Calendula, ii 14.  
 Calendula officinalis, iv 195.  
 Calico Bush, iv 27.  
 Californian Poppy, ii 41.  
 Calla (Arum Lily), ii 128.  
 Calliopsis, ii 24.  
 Callirhoe, ii 14.  
 Callirhoe spicata, ii 99.  
 Callistephus, ii 14.  
 Calluna vulgaris, iv 21.  
 Calocephalus Browni, ii 179.  
 Calochortus, ii 15.  
 Caltha, ii 15.  
 Calycanthus, iv 10.  
 Calyx, i 60.  
 Cambium layer, i 36, 37; use of in budding, i 38.  
 Cambridge Roll, iii 17.  
 Camellia, ii 144.  
 Camomile, iv 187.  
 Campanula, ii 15.  
 Campanula Medium, ii 16.  
 Campanula Rapunculus, iv 197.  
 Canary Creeper, ii 111.  
 Candytuft, ii 16.  
 Canker, Apple-tree, iii 88.  
 Canker Fungus, iii 48.  
 Canna, ii 145.  
 Canterbury Bells, ii 16.  
 Cape Pondweed, ii 7.  
 Caper Bush, iv 187.  
 Caper Spurge, ii 41; iv 187.  
 Capillary attraction, i 122.  
 Capparis spinosa, iv 187.  
 Capsicum, ii 145.  
 Capsicum annuum, iv 187.  
 Capsule, i 67.  
 Carabus violaceus, i 198.  
 Caragana, iv 10.  
 Caraway, iv 188.  
 Carbon bisulphide, i 213.  
 Carbon dioxide, assimilation of, i 44.  
 Carbonic acid gas, importance of, i 108, 141.  
 Cardoon, iv 188.  
 Carnation, American, ii 146.  
 Carnation, Border, ii 17.  
 Carnation maggot, i 177.  
 Carnation, Marguerite, ii 18.  
 Carnation, Perpetual Flowering, ii 146.  
 Carnations, Malmaison, ii 149.  
 Carnivorous Plants, ii 149.  
 Carolina Allspice, iv 10.  
 Carpels, i 62.  
 Carpenteria, iv 10.  
 Carpet-bedding plants, ii 149.  
 Carpinus, iv 10.  
 Carpocapsa funebrana, i 189.  
 Carpocapsa Pomonella, i 78, 178.  
 Carriage of vegetables, iv 67.  
 Carrot aphis, i 177.  
 Carrot-blossom Moth, i 177.  
 Carrot Fly, i 178.  
 Carrot in French gardens, iv 214.  
 Carrot-seed Moth, i 178.  
 Carrots, iv 94.  
 Carrot-top Fern, ii 225.  
 Cartwheel Flower, ii 53.  
 Carum Carui, iv 188.  
 Carum Petroselinum, iv 128.  
 Carya, iv 11.  
 Caryopteris, iv 11.  
 Caryota, ii 194.  
 Cassinia, iv 11.  
 Castanea, iv 11.  
 Castanopsis, iv 11.  
 Castor-oil plant, ii 93.  
 Catalpa, iv 11.  
 Catananche, ii 18.  
 Cattleya aurea, ii 190.  
 Cattleya labiata, ii 186.  
 Caulicle, i 36.  
 Cauliflower disease of Strawberries, iii 171; of Potatoes, iv 153.  
 Cauliflowers, iv 96; in French Gardens, iv 214.  
 Caustic winter wash, i 213.  
 Cayenne Pepper, iv 187.  
 Ceanothus, iv 11.  
 Cecidomyia pyrivora, i 186.  
 Cedar, iv 60.  
 Cedar, Stinking, iv 65.  
 Cedrus, iv 60.  
 Celastrus, iv 11.  
 Celeriac, iv 99.  
 Celery, iv 98, 217.  
 Celery blight, i 209.  
 Celery Fly, i 178; iv 100.  
 Celery Stem Fly, i 178; iv 101.  
 Cell contents, i 23.  
 Cell life, simple and complex, i 20.  
 Cell walls, changes in, i 24.  
 Cell wood, i 24.  
 Cells, forms of, i 24; growth of, i 22; palisade, i 43; uses of different, i 25.  
 Cellular plants, i 20.  
 Cellulose, i 23.  
 Celosia, ii 150.  
 Cemiosstoma scitella, iii 105.  
 Centaurea, ii 18.  
 Centaurea Cyanus, ii 24.  
 Centaurea sauveolens, ii 108.  
 Centipedes, i 201.  
 Centranthus, ii 18.  
 Cephalaria, ii 19.  
 Cephalotus follicularis, i 51; ii 149.  
 Cephalotaxus, iv 60.  
 Cerastium, ii 19.  
 Cerasus, iv 12.  
 Ceratostigma, ii 19.  
 Cercis, iv 12.  
 Cercospora apii, i 209.  
 Cercospora circumscissa, i 208.  
 Cercospora Melonis, i 209; iii 212, 109.  
 Cereus, ii 140.  
 Cestrum, ii 150.  
 Cetonia aurata, i 190.  
 Ceutorhynchus sulicollis, i 177; iv 183.  
 Ceutorhynchus pleurostigma, i 193.  
 Chærophyllum bulbosum, iv 189.  
 Chaining ground, iii 215.  
 Chalk, i 92, 160.  
 Chamæcyparis, iv 60.  
 Chamædorea, ii 194.  
 Chamælirion, ii 19.  
 Chamæpeuce Cassabonæ, ii 23.  
 Chamærops Fortunei, ii 194.  
 Chamærops humilis, ii 194.  
 Chamomile, iv 187.  
 Channel Islands, Potatoes, iv 134.  
 Channel Islands, Tomatoes, iv 166.  
 Cheddar Pink, ii 35.  
 Cheilanthes, ii 226.  
 Cheimatobia brumata, i 193.  
 Cheiranthus alpinus, ii 19.  
 Cheiranthus Cheiri, ii 118.  
 Chelone, ii 19.  
 Chenopodium Bonus-Henricus, iv 193.  
 Chenopodium scoparium, ii 62.  
 Cherries, iii 119; iv 12; raceage under, iii 120; cost of growing, receipts, etc., iii 128; picking and marketing, iii 125; plum, iv 34; planting of, iii 121; pruning of, iii 124.

- Cherry Aphis, i 178.  
 Cherry, Bird, iv 12.  
 Cherry Black Fly, iii 130.  
 Cherry, Cornelian, iv 18.  
 Cherry Crab, Siberian, iv 35.  
 Cherry, diseases and pests of, iii 129.  
 Cherry Leaf Scorch, iii 129.  
 Cherry Laurel, iv 12.  
 Cherry orchards, management of, iii 123.  
 Cherry Pie, ii 174.  
 Cherry Plum, iv 34.  
 Cherry Sawfly, i 178.  
 Chervil, iv 189.  
 Chervil, bulbous-rooted, iv 189.  
 Chestnut, Horse, iv 3.  
 Chestnut, Sweet, iv 11.  
 Chichester Elm, iv 54.  
 Chicory, iv 189.  
 Chili Pepper, iv 187.  
 Chili Pine, iv 60.  
 Chili saltpetre, i 154.  
 Chimonanthus fragrans, iv 10.  
 China Aster, ii 19.  
 Chinese Artichoke, iv 74.  
 Chinese Lanterns, ii 85.  
 Chinese Lyre Flower, ii 36.  
 Chinese Pink, ii 35.  
 Chinese Primula, ii 203.  
 Chinese Rice Paper Tree, iv 5.  
 Chionanthus, iv 12.  
 Chionodoxa, ii 20.  
 Chittam Wood, iv 37.  
 Chives, iv 190.  
 Chloride of sodium, i 162.  
 Chlorophyll, i 23; plants with, i 26; plants without, i 26.  
 Choisya, iv 12.  
 Chokeberry, American, iv 34.  
 Chou de Burghley, iv 8.  
 Christmas Rose, ii 52.  
 Christmas Trees, iv 62.  
 Christ's Thorn, iv 31.  
 Chrysalides of Insect Pests, i 171.  
 Chrysalidocarpus lutescens, ii 192.  
 Chrysanthemum, annual, ii 21.  
 Chrysanthemum diseases, ii 155.  
 Chrysanthemum, Florist's, ii 150.  
 Chrysanthemum frutescens, ii 182.  
 Chrysanthemum Leaf-miner, i 178.  
 Chrysanthemum, perennial, ii 21.  
 Chrysobactron, ii 22.  
 Chrysophlictis endobiotica, i 210; iv 153.  
 Chusan Palm, ii 194.  
 Cibotium Schiedei, ii 226.  
 Cichorium Endivia, iv 109.  
 Cichorium Intybus, iv 189.  
 Cigar Plant, ii 161.  
 Cimicifuga, ii 22.  
 Cineraria, ii 156.  
 Cineraria maritima, ii 18.  
 Circles, measurement of, iii 223.  
 Circulation of hot water, i 235.  
 Cissus, ii 157.  
 Cistus, iv 13.  
 Cladodes, i 42.  
 Cladosporium carpophilum, i 207.  
 Cladosporium cucumerinum, i 209.  
 Cladosporium fulvum, iv 180.  
 Cladrastis, iv 13.  
 Clammy-leaved plants, i 28.  
 Clarkia, ii 23.  
 Clary, iv 190.  
 Clay, i 92.  
 Clematis, iv 13.  
 Clerodendron, ii 157; iv 17.  
 Clethra, iv 17.  
 Clianthus, iv 17.  
 Click Beetles, i 193; iv 179.  
 Climbers, woody, iv 1.  
 Climbing ferns, ii 228.  
 Climbing plants, i 29.  
 Clisiocampa neustria, i 185; iii 78.  
 Clivia, ii 157.  
 Cloche carrier, iv 211.  
 Cloches, iv 203, 210.  
 Clod crusher, iii 17.  
 Club root, i 21, 209; iv 182.  
 Club root and gas lime, i 161.  
 Cnicus, ii 23.  
 Cob Nuts, iii 203.  
 Cobæa, ii 23.  
 Coccinella, i 197.  
 Cochlearia Armoracia, iv 193.  
 Cockchafer, i 178.  
 Cockroach, i 178.  
 Cockscorn, ii 150.  
 Cockspur Thorn, iv 19.  
 Cocos, ii 192.  
 Codiaum, ii 159.  
 Codlin Moth, i 178; iii 78.  
 Codlins and cream, ii 39.  
 Cœlogyne cristata, ii 189.  
 Cold storage, ii 66, 180.  
 Coleus, ii 157.  
 Collar-rot of Gooseberries, iii 151.  
 Colletotrichum Lindemuthianum, i 208.  
 Colletotrichum Spinaceæ, i 210.  
 Collier Blight, i 174.  
 Collinsia, ii 23.  
 Colocasia antiquorum, ii 142.  
 Columbine, ii 8.  
 Colutea, iv 17.  
 Compensation Act, Market Gardeners', iii 9.  
 Composite crops, iv 72.  
 Comptonia, iv 18.  
 Conandron, ii 23.  
 Cone Flower, ii 94.  
 Conifers, iv 59.  
 Conifers, grafting, i 87.  
 Coniothyrium diplodiella, i 207.  
 Construction of greenhouses, i 218.  
 Convallaria majalis, ii 64.  
 Convolvulus, ii 23.  
 Co-operation in fruit growing, iii 98.  
 Copper sulphate wash, i 214.  
 Copperas, blue, i 214.  
 Coprolites, i 157, 164.  
 Coral spot, i 206.  
 Corchorus japonica, iv 27.  
 Cordyline, ii 158.  
 Coreopsis, ii 24.  
 Coriander, iv 190.  
 Coriandrum sativum, iv 190.  
 Coriaria, iv 18.  
 Cork Oak, iv 35.  
 Corms, i 39.  
 Cornel, iv 18.  
 Cornish boiler, i 234.  
 Cornish Elm, iv 54.  
 Cornflower, ii 24.  
 Corn Marigold, ii 21.  
 Corn Salad, iv 190, 217.  
 Cornelian Cherry, iv 18.  
 Cornus, iv 18.  
 Corolla, i 60.  
 Coronilla, ii 159; iv 18.  
 Corsican Pine, iv 62.  
 Corstorphine Maple, iv 3.  
 Cortadeira, ii 50.  
 Corydalis, ii 24.  
 Corylus, iv 18.  
 Corylus Avellana, iii 203.  
 Corypha australis, ii 193.  
 Cosmos, ii 24.  
 Cossus ligniperda, i 182.  
 Cost of French gardening, iv 213.  
 Cost of motor traction, iv 68.  
 Cotoneaster, iv 18.  
 Cotton Lavender, iv 50.  
 Cotyledon, i 42; ii 159.  
 Countryman's Treacle, iv 197.  
 Cowberry, iv 54.  
 Cowherb, ii 95.  
 Cow Parsnip, ii 53.  
 Cowslip, ii 87.  
 Cowslip, American, ii 37.  
 Crab Apple, iii 57.  
 Crab, Siberian, iv 35.  
 Crab stock, iii 21.  
 Crambe maritima, iv 160.  
 Crane fly, i 178.  
 Crane's Bill, ii 47.  
 Crassula, ii 141.  
 Crassula coccinea, ii 177.  
 Crassula falcata, ii 93.  
 Cratægus, iv 19.  
 Creeping Jenny, ii 69.  
 Creeping Sailor, ii 96.  
 Cress, iv 190.  
 Cress, Indian, iv 195.  
 Cress, Water, iv 200.



Crinum, ii 159.  
 Crioceris asparagi, i 174; iv 80  
 Crocosma aurea, ii 110.  
 Crocus, ii 24.  
 Cross-breeding, i 66.  
 Croton, ii 159.  
 Crown Daisy, ii 21.  
 Crown Gall, iii 163.  
 Crown Imperial, ii 44.  
 Cryptomeria, iv 60.  
 Cucumber fruit spot, i 209.  
 Cucumber leaf blotch, i 209; iii 212.  
 Cucumber Tree, iv 30.  
 Cucumbers, iv 101, 217; diseases and pests, iv 107.  
 Cucumis Melo, iii 209.  
 Cucumis sativus, iv 101.  
 Cucurbita Pepo ovifera, vi 184.  
 Cultivator, iii 16.  
 Cultural operations, i 101.  
 Culver's physic, ii 115.  
 Cunninghamia, iv 60.  
 Cuphea, ii 161.  
 Cupram, i 212.  
 Cupressus, iv 60.  
 Curculigo, ii 161.  
 Currant Aphis, i 181.  
 Currant big-bud, iii 157.  
 Currant Clearwing Moth, i 181.  
 Currant Gall Mite, i 181.  
 Currant leaf blight, i 206.  
 Currant leaf spot, iii 152.  
 Currant Moth, iii 157.  
 Currant Root Aphis, i 181.  
 Currant Sawfly, i 181; iii 146.  
 Currant scale, i 181.  
 Currant Shoot Moth, i 181; iii 157.  
 Currants, iii 153.  
 Currants, cost of cultivation, iii 154, 155.  
 Currants, Black, iii 156.  
 Currants, Red, iii 154.  
 Currants, White, iii 156.  
 Cushion Irises, ii 61.  
 Cushion Saxifrages, ii 96.  
 Cuttings, leaf, i 77.  
 Cuttings, propagation by, i 75.  
 Cuttings, root, i 79.  
 Cuttings, woody, i 76.  
 Cyaniding, i 169.  
 Cyanophyllum, ii 161.  
 Cycads, ii 161.  
 Cyclamen, Hardy, ii 26.  
 Cyclamen, Persian, ii 162.  
 Cydonia japonica, iv 35.  
 Cydonia vulgaris, iii 107.  
 Cylindrosporium Padi, i 207.  
 Cymbidium, ii 190.  
 Cyme, forms of, i 57.  
 Cynara Cardunculus, iv 188.  
 Cynara Scolymus, iv 73.  
 Cyperus, ii 164.  
 Cypress, iv 60.  
 Cypress, Deciduous, iv 64.

Cypress Spurge ii 41.  
 Cyripedium insigne, ii 189.  
 Cyrtodeira, ii 167.  
 Cyrtomium falcatum, ii 224.  
 Cytisus, ii 165; iv 19.  
 Cystopteris, sporangium of, ii 211.  
 Cystopus candidus, i 209.

## D

Dabœcia, iv 19.  
 Dactylis, ii 26.  
 Dactylopius adonidum, i 185.  
 Dactylopius citri, iii 198.  
 Dactylopius longispinus, iii 198.  
 Daddy Longlegs, i 181.  
 Dæmonorops, ii 194.  
 Daffodils, ii 26; bunching and marketing, ii 28.  
 Dahlia, ii 30; insect pests of, ii 33; lifting and storing, ii 34.  
 Daisies, ii 12.  
 Daisies, Michaelmas, ii 10.  
 Daisies, Shasta, ii 22.  
 Daisy Bush, iv 31.  
 Daisy, Crown, ii 21.  
 Daisy, Great Ox-eye, ii 22.  
 Daisy, Hen and Chickens, ii 12.  
 Dalmatian insect powder, i 216.  
 "Damping-off" fungus, i 28.  
 Damsons, iii 118.  
 Danæa Laurus, i 41.  
 Dandelion, iv 191.  
 Daphne, iv 20.  
 Daphniphyllum, iv 20.  
 Darlingtonia, ii 149.  
 Dart Moths, i 181.  
 Darwin's Barberry, iv 8.  
 Dasyscypha calycina, iii 48.  
 Date Palm, ii 193.  
 Datura, ii 165.  
 Daucus Carota, iv 94.  
 Davallia, ii 226.  
 Day Lily, ii 53.  
 Deciduous Cypress, iv 64.  
 Deep tillage, i 104, 114; iv 70.  
 Defoliating Tomatoes, iv 171.  
 Delphinium, ii 34.  
 Dendrobiums, ii 190.  
 Denitrification, i 128.  
 Deodar, iv 60.  
 Depressaria depressella, i 178.  
 Depressaria Pastinacella, i 177.  
 Desert plants, i 27.  
 Desfontainea, iv 20.  
 Desmodium, ii 166.  
 Dessert Apples, iii 71.  
 Deutzia, iv 20.  
 Devil-in-the-bush, ii 75.  
 Devil's Coach-horse, i 198.  
 Dew, absorption of, i 107.  
 Dewberry, iv 54.  
 Diamond-back Moth, i 181.

Dianthus, ii 35.  
 Dianthus barbatus, ii 108.  
 Dianthus Caryophyllus, ii 17.  
 Dianthus chinensis, ii 35.  
 Diaspis ostræformis, i 186.  
 Dicentra, ii 36.  
 Dicksonia, ii 226.  
 Dicotyledons, i 38.  
 Dictamnus, ii 36.  
 Die-back of Gooseberries, iii 151.  
 Die-back of Peach shoots, iii 140.  
 Dieffenbachia, ii 166.  
 Dielytra, ii 36.  
 Diervilla, iv 20.  
 Digging, i 102; double, i 103; by dynamite, i 102.  
 Digitalis purpurea, ii 43.  
 Dill, iv 191.  
 Diloba cœruleocephala, i 182.  
 Dimorphanthus mandschuricus, iv 5.  
 Dimorphotheca, ii 37.  
 Diœcious flowers, i 64.  
 Dionæa muscipula, ii 149.  
 Dipladenia, ii 166.  
 Diplopappus chrysophyllus, iv 11.  
 Diplosis pyrivora, i 186; iii 105.  
 Diseases, fungoid, i 203; iii 46.  
 Dittany, ii 36.  
 Ditula angustiorana, i 182.  
 Dodecatheon, ii 37.  
 Dog Rose, iv 39.  
 Dog's Tooth Violet, ii 40.  
 Dogwood, iv 18.  
 Doodia, ii 227.  
 Doronicum, ii 37.  
 Doryopteris, ii 227.  
 Double-digging, cost of, iii 17.  
 Douglas Fir, iv 63.  
 Downton Elm, iv 54.  
 Draba, ii 93.  
 Dracæna, ii 166.  
 Dracocephalum, ii 38.  
 Dragon's Heads, ii 38.  
 Dragon's Mouth, ii 10.  
 Drosera, i 29.  
 Drosophila melanogaster, iii 199.  
 Drupe, i 68.  
 Duckweed, i 22.  
 Duckweed, Fruiting, ii 74.  
 Dumpy Level, iii 218.  
 Dutch Honeysuckle, iv 29.  
 Dutchman's Breeches, ii 36.  
 Dutchman's Pipe, ii 128.  
 Dyckia princeps, ii 142.  
 Dyer's Greenweed, iv 23.  
 Dynamite digging, i 102.

## E

Ear-shelled Slug, i 200.  
 Earthing up Potatoes, iv 147.  
 Earthworms, i 101.

Earwigs, i 181.  
 East Lothian Stock, i 103.  
 Echeveria, ii 159.  
 Echinacea, ii 38.  
 Echinocactus, ii 140.  
 Echinops, ii 38.  
 Echinopsis, i 140.  
 Echites, ii 167.  
 Edelweiss, ii 49.  
 Edwardsia tetraptera, iv 50.  
 Eel-worm, Root, iii 171.  
 Eel-worms, i 182; iv 178.  
 Egg cell, i 65.  
 Egg-plant, ii 206; iv 192.  
 Eichhornea, ii 13.  
 Elæagnus, iv 21.  
 Elater lineatus, i 193.  
 Elder, iv 50.  
 Electric plough, i 102.  
 Electrifying soil, i 131.  
 Elm, iv 54.  
 Elymus, ii 38.  
 Embothrium, iv 21.  
 Embryo, i 65.  
 Embryo sac, i 66.  
 Emerald Green, i 216.  
 Emphytus cinctus, i 190.  
 Encrusted Saxifrages, ii 97.  
 Endive, iv 109; 218.  
 Endopisa proximana, i 186.  
 Endosperm, i 68.  
 English Iris, ii 61.  
 Entomosporium maculatum, i 207.  
 Entyloma Ellisi, i 210.  
 Eomecon, ii 38.  
 Epacris, ii 167.  
 Epidermis, i 43.  
 Epilobium, ii 38.  
 Epimedium, ii 39.  
 Episcea, ii 167.  
 Epsom Salts, i 161.  
 Eranthis, ii 39.  
 Eremurus, ii 39.  
 Erianthus Ravennæ, ii 50.  
 Erica, ii 173; iv 21.  
 Erigeron, ii 39.  
 Eriobotrya japonica, iv 33.  
 Eriocampa limacina, i 189, 190; iii 105.  
 Eriocampa rosæ, i 190.  
 Eriophyes Ribis, i 181; iii 157.  
 Eriophyes Pyri, iii 106.  
 Erodium, ii 39.  
 Eryngium, ii 40.  
 Erysimum ochroleucum, ii 19.  
 Erythrina, ii 167.  
 Erythronium, ii 40.  
 Escallonia, iv 21.  
 Eschscholtzia, ii 41.  
 Eucalyptus, ii 167.  
 Eucharis, ii 168.  
 Eucharis Mite, i 182; ii 168.  
 Eucomis, ii 41.  
 Eumerus æneus, i 186.  
 Euonymus, iv 22.  
 Eupatorium, ii 41, 168.  
 Euphorbia, ii 41, 141.

Euphorbia pulcherrima, ii 201.  
 Euphorbia Lathyris, iv 187.  
 Eurya, ii 168.  
 Eurybia Gunniana, iv 3.  
 Euterpe edulis, ii 194.  
 Euterpe oleracea, ii 194.  
 Eutypella Prunastri, i 208.  
 Evaporation from leaves, i 120; from soil, i 121.  
 Evening Primrose, ii 76.  
 Everlasting Flowers, ii 41.  
 Evesham Custom, iii 12.  
 Evesham, fruit-growing in, iii 27.  
 Exacum, ii 169.  
 Exeter Elm, iv 54.  
 Exoascus deformans, i 207; iii 139.  
 Exoascus Pruni, i 209.  
 Exochorda, iv 22.  
 Expenses of a French garden, iv 213.

## F

Faba vulgaris, iv 81.  
 Fagus, iv 22.  
 Fair Maids of France, ii 92.  
 Fair Maids of Kent, ii 92.  
 Fall of leaf, i 51.  
 False Acacia, iv 38.  
 Fan Palm, ii 193.  
 Farmyard manure, i 146.  
 Farmyard manure, value of, i 147.  
 Fatsia japonica, ii 127.  
 Feather Grass, ii 50.  
 Feathers as manure, i 153.  
 Fennel, iv 192.  
 Fennel Flower, ii 75.  
 Fern frond, stomata on, i 43.  
 Fern Mite, ii 222.  
 Fern soil, ii 220.  
 Fern spores, sowing, ii 221.  
 Ferns, ii 211; chemical composition of, ii 221; life-history of, ii 211; prothallium of, ii 213.  
 Ferns, Buckler, ii 228.  
 Ferns, Climbing, ii 228.  
 Ferns, Cultivation of, ii 219.  
 Ferns, Filmy, 234.  
 Ferns, Fishbone, ii 228.  
 Ferns, hybridization of, ii 218.  
 Ferns, Ladder, ii 228.  
 Ferrous sulphate, i 215.  
 Fertilization of flowers, i 65.  
 Feverfew, ii 91.  
 Fibres, wood, i 25.  
 Ficus, ii 169.  
 Ficus Carica, iii 174.  
 Field Book, iii 216.  
 Fig canker, iii 177.  
 Fig Marigold, ii 183.  
 Fig rot, iii 178.  
 Figs, iii 174; under glass, iii 176.  
 Figure-of-eight Moth, i 182.

Filberts, iii 203; iv 18.  
 Filices, ii 219.  
 Filmy Ferns, ii 234.  
 Finger-and-toe Disease, i 209.  
 Fire Bush, iv 21.  
 Firethorn, iv 19.  
 Fir, Scots, iv 62.  
 Fir, Silver, iv 62.  
 Fir, Spruce, iv 62.  
 Fish-bone Ferns, ii 228.  
 Fish-bone Thistle, ii 23.  
 Fish Guano, i 151.  
 Fish-oil Soap, i 216.  
 Fixation of nitrogen by legumes, i 127.  
 Flag Iris, ii 58.  
 Flame Flower, ii 62; 112.  
 Flamingo Plant, ii 126.  
 Flannel Flower, ii 44.  
 Flax, ii 67.  
 Flax, New Zealand, ii 84.  
 Floral decorations, i 8.  
 Florist trade, the, i 7.  
 Florists' Flowers, i 9.  
 Flower and its functions, the, i 60.  
 Flower-buds and pruning, i 57.  
 Flowering Currant, iv 38.  
 Flowering Dogwood, iv 18.  
 Flowering Fern, ii 230.  
 Flower-pot measurements, ii 227.  
 Flowers for wreaths, etc., i 10.  
 Foam Flower, ii 109.  
 Foeniculum dulce, iv 193.  
 Foeniculum vulgare, iv 192.  
 Follicle, i 67.  
 Fomes annosus, iii 48.  
 Food materials, transport of, i 53.  
 Foods of plants, i 108.  
 Ford's Elm, iv 54.  
 Forest Trees, Raising, i 12.  
 Forficula auricularia, i 181.  
 Forget-me-not, ii 43.  
 Forsythia, iv 22.  
 Foxglove, ii 43.  
 Fragaria, iii 164.  
 Frames and cloches, iv 203.  
 Francisea, ii 139.  
 Francoa, ii 44.  
 Fraxinella, ii 36.  
 Fraxinus, iv 22.  
 Freesia, ii 169.  
 Free Stock, iii 22.  
 French Bean, iv 84.  
 French Climbing Beans, iv 85.  
 French garden receipts, iv 214.  
 French garden expenses, iv 214.  
 French garden crops, iv 214.  
 French gardening, iv 203.  
 French Green, i 216.  
 Fringe tree, iv 12.  
 Fritillaria, ii 44.



Frog-hopper, i 190.  
 Frogs, i 199.  
 Frost, action of, i 99; protection against, iii 52.  
 Fruit crops, ash analyses of, i 109.  
 Fruit diseases, fungoid, iii 46.  
 Fruit, formation of, i 67; grading, iii 54; grading and packing, iii 53; packing, iii 54.  
 Fruit garden, site for a, iii 3.  
 Fruit-grower and local rates, iii 7.  
 Fruit-growing, commercial, iii 1; returns from, iii 25; in Ireland, iii 41, 44; in Scotland, iii 33; in the Teme Valley, iii 32; in Worcestershire, iii 27.  
 Fruit plantation, cost of making, iii 2.  
 Fruit room, iii 64.  
 Fruit soil, analysis of, iii 4.  
 Fruit-tree Beetle, i 182.  
 Fruit-tree smudging, iii 52.  
 Fruit-tree spraying, iii 49.  
 Fruit-tree stocks, iii 21.  
 Fruit trees, cost of planting, iii 2, 23; fungoid diseases of, i 205; hiring, iii 13; method of planting, iii 20; overcrowding, iii 62; preparation of land for, iii 15; pruning, iii 23; staking, iii 23.  
 Fuchsia, ii 171; iv 23.  
 Fumigating, i 168.  
 Fumitory, ii 24.  
 Fungi, beneficial, i 95; diseases caused by, iii 46.  
 Fungicides, i 49, 211; fungicides and spraying, iii 49.  
 Fungoid diseases, i 203; of fruit trees, i 205; iii 46; of vegetables, i 208.  
 Funkia, ii 44.  
 Furze, iv 54.  
 Fusarium lycopersici, i 210; iv 180.  
 Fusicladium cerasi, i 206.  
 Fusicladium dendriticum, i 206; iii 84.  
 Fusicladium pyrinum, i 207.

## G

Gaillardia, ii 44.  
 Galanthus, ii 45.  
 Galax, ii 46.  
 Galega, ii 46.  
 Galtonia, ii 46.  
 Garden chafer, i 182.  
 Garden friends, i 197.  
 Garden mensuration, iii 213.  
 Garden Pearl Moth, i 182.  
 Garden Spider, i 201.  
 Garden surveying, iii 213.  
 Garden Swift Moth, iii 170.

Gardener's Garters, ii 50.  
 Gardenia, ii 171.  
 Garlic, iv 193.  
 Garrya, iv 23.  
 Gas lime, i 161.  
 Gasteria, ii 141.  
 Gaultheria, iv 23.  
 Gazania, ii 46.  
 Geans (Cherry), iii 119.  
 Genista, ii 165; iv 23.  
 Gentiana, ii 46.  
 Geonoma, ii 192.  
 Geophilus subterraneus, i 201.  
 Geranium, ii 47.  
 Geranium (Zonal Pelargonium), ii 195.  
 Gerbera, ii 47.  
 German Iris, ii 58.  
 Germination of seeds, i 69.  
 Gesnera, ii 172.  
 Geum, ii 47.  
 Ghent Azaleas, iv 6.  
 Ghent leaf-mould, ii 132.  
 Ghost Swift Moth, i 182.  
 Gilia, ii 48.  
 Gillenia, ii 48.  
 Ginkgo, iv 61.  
 Gladiolus, ii 48.  
 Gladwin, ii 60.  
 Glasshouse-building, i 218; cost of, iii 181; heating of, i 231; on rails, i 230.  
 Glastonbury Thorn, iv 19.  
 Globe Artichoke, iv 73.  
 Globe Flower, ii 111.  
 Globe Thistle, ii 38.  
 Glæosporium fructigenum, i 206; iii 87.  
 Glæosporium ribis, i 206; iii 152.  
 Glæosporium venetum, i 208.  
 Glomurella rufo-maculans, iii 87.  
 Glory Fern, ii 223.  
 Glory of the Snow, ii 20.  
 Glory Pea, Australian, iv 17.  
 Gloxinia, ii 172.  
 Gluts in the market, iv 69.  
 Glycyrrhiza glabra, iv 194.  
 Gnaphalium, ii 49.  
 Gnomonia erythrostoma, iii 129.  
 Goat Moth, i 182.  
 Goat's Beard, ii 101.  
 Goat's Rue, ii 46.  
 Godetia, ii 50.  
 Gold and Silver Ferns, ii 227.  
 Golden Feather, ii 91.  
 Golden Heath, iv 11.  
 Golden Rod, ii 100.  
 Good King Henry, iv 193.  
 Gooseberries, iii 143; diseases of, i 206; iii 146.  
 Gooseberries, black knot of, iii 152.  
 Gooseberries, expenses and receipts, iii 143, 145.  
 Gooseberry collar rot, ii 151.  
 Gooseberry "dieback," i 206; iii 151.

Gooseberry-growing at Evesham, iii 30.  
 Gooseberry leaf spot, iii 152.  
 Gooseberry mildew, American, i 206; iii 147.  
 Gooseberry mildew, European, i 206; iii 150.  
 Gooseberry Red Spider, iii 146.  
 Gooseberry Sawfly, i 182; iii 146.  
 Gorse, iv 54.  
 Gorse, Spanish, iv 23.  
 Grading and packing fruit, iii 54.  
 Graft hybrid, iv 27.  
 Grafting, i 84; by approach, i 88; bottle, i 88; cleft and rind, i 86; herbaceous, i 87; root, i 88; saddle, i 86; whip, i 85.  
 Grafting wax, i 86.  
 Grape-fruit Fly, iii 199.  
 Grape-growing, cost of, iii 196.  
 Grape mildew, i 206; iii 200.  
 Grape Moth, i 182.  
 Grapes, iii 179; scalding of, iii 198; shanking, iii 198; marketing, iii 193; thinning, iii 190.  
 Grape Vine Anthracnose, i 206.  
 Grape Vine brown mildew, i 206.  
 Grape Vine powdery mildew, i 207; iii 200.  
 Grape Vine, propagation of, iii 195.  
 Grape Vine white rot, i 207.  
 Grass of Parnassus, ii 81.  
 Grasses, Ornamental, ii 50.  
 Great Winter Moth, i 185.  
 Greaves as manure, i 153.  
 Greenfly, i 182.  
 Greengage, iii 113.  
 Greenhouse boilers, i 232.  
 Greenhouse Plants, ii 122.  
 Greenhouses, construction of, i 218.  
 Greenhouses on rails, i 230.  
 Green manuring, i 148.  
 Green vitriol, i 215.  
 Grevillea, ii 172.  
 Griselinia, iv 23.  
 Ground Game Act, iii 13.  
 Ground Ivy, ii 74.  
 Gryllotalpa vulgaris, i 185.  
 Guano, Fish, i 151; Peruvian, i 150.  
 Guelder Rose, iv 55.  
 Guignardia Bidwelli, iii 201.  
 Gum Cistus, iv 13.  
 Gumming of fruit-trees, iii 52.  
 Gunnera, ii 50.  
 Gymnogramme, ii 227.  
 Gymnosporangium clavariæ-forme, i 206.  
 Gynerium, ii 50.

Gypsophila, ii 51.  
Gypsum, i 161.

## H

Haberlea, ii 51.  
Habrothamnus, ii 150.  
Hair as manure, i 153.  
Halesia, iv 24.  
Halia Wavaria, i 193.  
Haltica consobrina, i 177.  
Hamamelis, iv 24.  
Hand-working the soil, i 138.  
Hardy plant trade, i 4.  
Hardy trees and shrubs, iv 1.  
Harebell, ii 16.  
Hare's-foot Fern, ii 226.  
Harpalum, ii 51.  
Harpalus ruficornis, iii 170.  
Harrow, Drag, iii 16.  
Harrowing soil, i 106.  
Hart's-tongue Fern, ii 232.  
Hawkflies, i 199.  
Haworthia, ii 141.  
Hawthorn, iv 19.  
Hawthorn, Winter, ii 7.  
Hazel, iv 18.  
Hazel Nuts, iii 203.  
Heartwood rot of Apple-trees, iii 90.  
Heat, action of, i 99.  
Heath (*Erica*), ii 173; iv 21.  
Heath, Golden, iv 11.  
Heath, Prickly, iv 32.  
Heath, St. Dabeoc's, iv 19.  
Heather, White, iv 21.  
Heating apparatus, i 231.  
Hedera, iv 24.  
Hedgerow timber, iii 19.  
Hedysarum, iv 24.  
Heeling-in, dangers of, iii 48.  
Helenium, ii 51.  
Heliamphora nutans, i 49.  
Helianthemum, iv 24.  
Helianthus, ii 51.  
Helianthus annuus, ii 103.  
Helianthus tuberosus, iv 72.  
Helichrysum, ii 41.  
Heliconia, ii 174.  
Heliotrope, ii 174.  
Heliotropium, ii 174.  
Helipterum, ii 42.  
Helix hortensis, i 190.  
Hellebore powder, i 215.  
Hellebore, white, ii 114.  
Helleborus, ii 52.  
Helmont, Van, i 108.  
Helonias viridis, ii 114.  
Heliophorus rugosus, i 193.  
Helxine, ii 175.  
Hemerocallis, ii 53.  
Hemionitis, ii 227.  
Hemlock Spruce, iv 65.  
Hen and Chickens Daisy, ii 12.  
Hepialus humuli, i 182.  
Hepialus lupulinus, iii 170.  
Heracleum, ii 53.

Herbaceous plants, ii 1.  
Herb Christopher, ii 3.  
Herb of Grace, iv 197.  
Herbs, Sweet, iv 186.  
Hermaphrodite flowers, i 64.  
Herniaria, ii 53.  
Heterodera radicola, i 182; iv 178.  
Heterodera Schachtii, i 182.  
Heuchera, ii 53.  
Hibiscus, ii 54; iv 24.  
Hickory, iv 11.  
Hippeastrum, ii 175.  
Hippophae, iv 24.  
Hiring fruit-trees, iii 14.  
Hoeing, advantages of, i 106; cost of, iii 25.  
Holcus, ii 54.  
Holly, iv 25.  
Holly Fern, ii 224.  
Holly-leaved Barberry, iv 8.  
Holly Oak, iv 35.  
Hollyhock, ii 54.  
Hollyhock disease, 54.  
Holm, Oak, iv 35.  
Honesty, ii 55.  
Honey Flower, ii 71.  
Honeysuckle, iv 29.  
Honeysuckle Azalea, iv 6.  
Hop, ii 56.  
Hoplocampa fulvicornis, i 189; iii 113.  
Hoplocampa testudinea, i 174; iii 80.  
Hop mildew, i 209; iii 172.  
Hop-tree, iv 34.  
Horehound, iv 193.  
Hornbeam, iv 10.  
Horned Rampion, ii 85.  
Horse Chestnut, iv 3.  
Horse v. Motor, iv 67.  
Horse Radish, iv 193.  
Horticulture, development of, i 1.  
Hose Carrier, iv 212.  
Hot water circulation, i 235.  
Hot water piping, i 237.  
Hoteia (*Spiraea*) japonica, ii 206.  
Houseleek, ii 98.  
Howea, ii 193.  
Huckleberry, iv 54.  
Humea, ii 175.  
Humulus Lupulus, ii 56.  
Humus, i 94, 136; advantages of, i 94; composition of, i 95.  
Hyacinth, ii 56.  
Hyacinths, Roman, ii 57.  
Hyacinthus candicans, ii 46.  
Hyalopterus pruni, iii 114.  
Hybernia defoliaria, i 185, 193.  
Hybridization, i 66.  
Hydrangea hortensis, ii 175; iv 25.  
Hydrocyanic acid gas, i 169.  
Hylemyia nigrescens, i 177.  
Hylotoma rosæ, i 190.  
Hymenanthra, iv 25.

Hymenophyllum tunbridgense, ii 235.  
Hyophorbe Verschaffeltii, ii 194.  
Hypericum, iv 25.  
Hypomyces perniciosus, i 209; iv 123.  
Hyponomeuta padella, i 190.  
Hyssop, iv 194.  
Hyssopus officinalis, iv 194.

## I

Iberis, ii 16.  
Iceland Poppy, ii 81.  
Ice Plant, ii 183.  
Ichneumon flies, i 199.  
Idesia, iv 25.  
Ilex, iv 25.  
Imantophyllum, ii 157.  
Immortelles, ii 42.  
Impatiens, ii 176.  
Impatiens Balsamina, ii 133.  
Inarching, i 88.  
Incarvillea, ii 57.  
Income tax and market gardening, iii 8.  
Incurvaria capitella, i 181; iii 157.  
Indian Azalea, ii 130.  
Indian Bean, iv 11.  
Indian Corn, ii 120; iv 110.  
Indian Cress, iv 195.  
Indian Pink, ii 35.  
Indian Shot, ii 145.  
India-Rubber Plant, ii 169.  
Indigofera, iv 26.  
Indusium, Fern, ii 212.  
Inflorescence, forms of, i 56.  
Ingenhousz, J. van, i 108; iv 147.  
Inoculation of the soil, i 127.  
Insect agency, i 65.  
Insect friends, i 197.  
Insect pests, i 167; cause of, i 170; greenhouse, i 167; life-history of, i 170; outdoor, i 169; prevention of, i 171; table of, i 173.  
Insect powder, Dalmatian, i 216; Persian, i 216.  
Insecticides, i 211.  
Insectivorous plants, i 28.  
Intensive cultivation, iv 203.  
Intermediate Stocks, ii 103.  
Inula, ii 58.  
Ipomæa purpurea, ii 23.  
Ipomopsis elegans, ii 48.  
Ireland, fruit-growing in, iii 41.  
Iresine, ii 176.  
Iris, ii 58.  
Iris, Bulbous, ii 61.  
Iris, English, ii 61.  
Iris, Florentine, ii 58.  
Iris, German, ii 58.  
Iris, Spanish, ii 59.  
Iron, i 135, 162.  
Iron sulphate, i 215.



Isolepis, ii 177.  
 Isopyrum, ii 61.  
 Italian Poplar, Black, iv 33.  
 Ivy, iv 24.  
 Ivy-leaf Fern, ii 227.  
 Ixia, ii 61.  
 Ixora, ii 177.

## J

Jacobinia, ii 177.  
 Jacob's Ladder, ii 85.  
 Japanese gardening, i 13.  
 Japanese Iris, i 15.  
 Japanese Maples, i 18; iv 3.  
 Japanese Quince, iv 35.  
 Japanese Wineberry, iii 163; iv 49.  
 Jasmine, iv 26.  
 Jasminum, iv 26.  
 Jersey Potatoes, iv 134.  
 Jerusalem Artichoke, iv 72.  
 Jerusalem Sage, iv 33.  
 Job's Tears, iv 51.  
 Judas Tree, iv 12.  
 Juglans, iv 27.  
 Juglans regia, iii 206.  
 Julius worms, i 182.  
 Juncus, ii 13.  
 Juniper, iv 61.  
 Juniperus, ii 177; iv 61.  
 Justicia, ii 177.

## K

Kainit, i 158.  
 Kalanchoe, ii.  
 Kale, iv 66.  
 Kalmia, iv 27.  
 Kalosanthes, ii 177.  
 Kaulfussia, ii 61.  
 Kenilworth Ivy, ii 66.  
 Kentia, ii 192.  
 Kermes Oak, iv 35.  
 Kerose emulsion, i 215.  
 Kerria, iv 27.  
 Kidbrook Elm, iv 54.  
 Kidney Bean, iv 84.  
 Killarney Fern, ii 235.  
 Kingcup, ii 15.  
 King's Spear, ii 10.  
 Kleinia, ii 177.  
 Kniphofia, ii 61.  
 Knotweed, ii 86.  
 Kochia, ii 62.  
 Kœlreuteria, iv 27.  
 Kœniga maritima, ii 4.  
 Kohlrabi, iv 111.

## L

Laburnum, iv 27.  
 Lacewing Flies, i 200.  
 Lachenalia, ii 177.  
 Lackey Moth, i 185; iii 78.  
 Lactuca sativa, iv 113.  
 Ladder Ferns, ii 228.

Lad's Love, ii 9.  
 Lady-birds, i 197.  
 Lady Fern, ii 215.  
 Lady's Locket, ii 36.  
 Lady's Mantle, ii 4.  
 Lady's Slipper Orchids, ii 190.  
 Lælias, ii 187.  
 Lamb's Lettuce, iv 190, 217.  
 Lampronia rubiella, i 189; iii 162.  
 Land chaining, iii 215; cleaning for fruit, iii 19; monopoly, iii 9; planting, iii 220; surveying, iii 213; tenure, iii 8.  
 Land measure, iii 214; tables, iii 214, 215, 220, 221; measuring, iii 213.  
 Landlord and Tenant, iii 12.  
 Lantana, ii 178.  
 Lapageria, ii 178.  
 Larch, iv 61.  
 Larix, iv 61.  
 Larkspur, ii 34.  
 Lastræa, ii 225, 228.  
 Latania borbonica, ii 193.  
 Lathyrus odoratus, ii 104.  
 Laurel, Alexandrian, i 41; iv 49.  
 Laurel, Bay, iv 27.  
 Laurel, Cherry, iv 12.  
 Laurel, Portugal, iv 12.  
 Laurel, Wood or Spurge, iv 20.  
 Laurus, iv 27.  
 Laurustinus, iv 55.  
 Lavandula, iv 28.  
 Lavender, iv 28.  
 Lawn Cypress, i 63.  
 Laxton Berry, iii 163.  
 Layering, i 80.  
 Laying out land, iii 220.  
 Leaf curl of peaches, iii 139.  
 Leaf, fall of, i 51; structure, i 42.  
 Leaf mould, composition of, i 95.  
 Leaf mould, Ghent, ii 132.  
 Leaf spot of Tomatoes, iv 180.  
 Leather Waste Manure, i 153.  
 Leaves and their work, i 42; arrangement of, i 46; as manure, i 149; evaporation from, i 120; forms of, i 45; propagation by, i 77; seed, i 42; true, i 42; water transpired from, i 120.  
 Lecanium persicæ, i 186; iii 141.  
 Leeks, iv 112.  
 Legume, i 67.  
 Leguminous crops, iv 72.  
 Leguminous plants, fixing nitrogen, i 127; as green manures, i 149.  
 Lemon-scented Verbena, ii 125.  
 Lenten Rose, ii 52.  
 Lenticels, i 36.

Leontopodium alpinum, ii 49.  
 Leopard Lily, ii 64.  
 Leopard Moth, i 194.  
 Leopard's Bane, ii 37.  
 Lepidium sativum, iv 190.  
 Lepidosaphæes ulmi, iii 81.  
 Lettuce, iv 113; in French gardens, iv 218.  
 Lettuce fly, i 185.  
 Lettuce, Lamb's, iv 190, 217.  
 Lettuce-root Aphis, i 185.  
 Leucojum, ii 63.  
 Leucophytum, ii 179.  
 Levelling ground, iii 217.  
 Level, Dumpy, iii 218.  
 Levels, taking, iii 218.  
 Levying Rates, iii 7.  
 Leycesteria, iv 28.  
 Liatris, ii 63.  
 Libertella ulcerata, iii 177.  
 Libocedrus, iv 62.  
 Lichens, i 27.  
 Licuala, ii 193.  
 Liebig, Baron von, i 137.  
 Light, necessity of, i 44.  
 Ligustrum, iv 28.  
 Lilac, iv 52.  
 Lilies, Day, ii 53.  
 Lilium, i 15; ii 63.  
 Lilium longiflorum, ii 179.  
 Lily of the Valley, ii 64.  
 Limax ater, i 190.  
 Lime, i 93, 159; gas, i 161; in an acre of soil, i 142; nitrate of, i 154.  
 Lime-carbonate, i 134.  
 Lime-sulphur mixture, iii 50.  
 Lime-sulphur-soda wash, i 214.  
 Lime tree, iv 53.  
 Limestone, i 93.  
 Limphos manure, i 158.  
 Linaria, ii 66.  
 Ling, Common, iv 21.  
 Links in a chain, iii 215.  
 Linospadix Micholitzii, ii 194.  
 Linum, ii 67.  
 Lippia citriodora, ii 125.  
 Liquidambar, iv 29.  
 Liquorice, iv 194.  
 Liriodendron, iv 29.  
 Lithospermum, ii 67.  
 Liver of Sulphur, i 216.  
 Livistona, ii 193.  
 Lizards, i 199.  
 Loam, i 92.  
 Lobelia, ii 67.  
 Lobelia, Bedding, ii 182.  
 Loganberry, iii 162.  
 Loganberry growing at Evesham, iii 31.  
 Lomaria, ii 227.  
 Lombardy Poplar, iv 33.  
 London Plane tree, iv 33.  
 London Pride, ii 95.  
 Lonicera, iv 29.  
 Loose-leaf books, iii 234.  
 Loquat, iv 33.  
 Lords and Ladies, ii 10.  
 Love-in-a-mist, ii 75.

Love-lies-bleeding, ii 5.  
 Low Berry, iii 163.  
 Lozotania Rosana, i 190.  
 Lunaria biennis, ii 55.  
 Lupinus, ii 68.  
 Lychnis, ii 68.  
 Lycopersicum esculentum, iv 164.  
 Lycopodiaceæ, ii 233.  
 Lycoris, ii 69.  
 Lygodium, ii 228.  
 Lyme Grass, ii 38.  
 Lyonetia Clerckella, i 186.  
 Lyre Flower, ii 36.  
 Lysimachia, ii 69.

## M

Macrosporium lycopersici, iv 180.  
 Macrosporium Solani, i 210; iv 152, 180.  
 Magnesia, i 136.  
 Magnesium salts, i 161.  
 Magnolia, iv 30.  
 Magpie Moth, i 185; iii 157.  
 Maidenhair Fern, ii 223.  
 Maidenhair Meadow Rue, ii 109.  
 Maidenhair tree, iv 61.  
 Maiden link ii 35.  
 Maiden's wreath, ii 44.  
 Mahonia Aquifolium, iv 8.  
 Maize, ii 120; iv 110.  
 Male Buckler Fern, ii 228.  
 Malmaison Carnations, ii 149.  
 Malope, ii 70.  
 Malt dust manure, i 153.  
 Mamestra Brassicæ, i 177.  
 Mammillaria, ii 140.  
 Mammoth Tree, iv 64.  
 Manna Ash, iv 22.  
 Manure basket, French, iv 209.  
 Manures, i 137; kinds of i 145; misleading experiments with, i 139; blood, i 152; calcareous, i 159; complete, i 146; farmyard, i 146 for Vegetables, iv 71; guano, i 150; mixing, i 164; leaves as, i 149; nitrogenous, i 154; phosphatic, i 156; potash, i 158; roots as, i 150; seaweed, i 151; table showing quantities per ton, i 164; valuation of, i 162.  
 Manurial mistakes, iv 139.  
 Manuring, object of, i 140.  
 Maple, iv 2.  
 Maple, Japanese, i 18; iv 3.  
 March Moth, i 185; iii 77.  
 Marguerites, ii 182.  
 Marguerite Carnations, ii 18.  
 Marigold, African, ii 70.  
 Marigold, Common, ii 14; iv 195.  
 Marigold, Fig, ii 183.  
 Marigold, French, ii 70.

Mariposa Lily, ii 15.  
 Marjoram, iv 195.  
 Market garden accounts, iii 228.  
 Market garden, condition of holding, iii 8; cost of, iii 230; expenses, iii 231; receipts, iii 232.  
 Market gardener and income tax, iii 8.  
 Market Gardeners' Compensation Act, iii 9.  
 Market gardening, i 6.  
 Market gardens, rating of, iii 7.  
 Market growing, i 6.  
 Markets, access to, iv 66.  
 Marl, i 160.  
 Marrow, Vegetable, iv 184.  
 Marrubium vulgare, iv 193.  
 Marsh Marigold, ii 15.  
 Marsh plants, ii 13.  
 Martinezia caryotæfolia, ii 195.  
 Marvel of Peru, ii 70.  
 Masterwort, ii 11.  
 Matricaria, ii 70.  
 Matthiola annua, ii 102.  
 Matthiola incana, ii 103.  
 May (Hawthorn), iv 19.  
 May Bug, i 178.  
 Meadow Rue, ii 109.  
 Meadow Rue, Maidenhair, ii 109.  
 Meadow-sweet, ii 101.  
 Mealy bugs, i 185; iii 198.  
 Measure, circular, iii 223; conical, iii 224; cylindrical, iii 124; oval, iii 223; rectangular, iii 222; spherical, iii 224; square, iii 220; triangular, iii 224.  
 Measuring land, iii 213.  
 Meconopsis, ii 71.  
 Medlar, iii 108.  
 Medulla, i 37.  
 Medullary rays, i 3.  
 Megasea, ii 71.  
 Megaspores, i 65; ii 233.  
 Melianthus, ii 71.  
 Melissa officinalis, iv 186.  
 Melolontha vulgaris, i 178.  
 Melon-leaf blotch, iii 212.  
 Melons, iii 209.  
 Melons, "Nuile" disease, i 207.  
 Melons in French gardens, iv 222.  
 Mensuration, garden, iii 213.  
 Mentha, ii 71.  
 Mentha viridis, iv 116, 195.  
 Mentzelia Lindleyi, ii 12.  
 Merodon Narcissi, i 185.  
 Mertensia, ii 71.  
 Mesembryanthemum, ii 183.  
 Mespilus germanica, iii 108.  
 Mezereon, iv 20.  
 Michaelmas Daisies, ii 10.  
 Micrococcus amylovorus, i 205.

Micropyle, i 65.  
 Microsphæra grossulariæ, i 206; iii 150.  
 Microspores of Selaginella, ii 233.  
 Mignonette, ii 71.  
 Mildew, apple, i 205.  
 Mildew, American gooseberry, i 206.  
 Mildew, Onion, i 209.  
 Mildew, Rose, iv 48.  
 Mildew, Spinach, i 210.  
 Mildew, Strawberry, iii 172.  
 Millipedes, i 185.  
 Mimulus, ii 184.  
 Minorca Box, iv 10.  
 Mint, iv 116, 195.  
 Mirabilis Jalapa, ii 70.  
 Misleading experiments, i 139.  
 Mistletoe, iv 56.  
 Mite, Eucharis, i 182; ii 168.  
 Mite, Fern, ii 222.  
 Mitis Green, i 216.  
 Mixing manures, i 164.  
 Mock Orange, iv 32.  
 Moisture in soil, conserving, i 123.  
 Mole Cricket, i 185.  
 Monarda, ii 72.  
 Moneywort, ii 69.  
 Monilia fructigena, i 205, 207; iii 86.  
 Monkshood, ii 2.  
 Monocotyledons, i.  
 Monœcious flowers, i 64.  
 Monkey-puzzle Tree, iv 60.  
 Montbretia (Tritonia), ii 110.  
 Morina, ii 72.  
 Morisia, ii 72.  
 Morning Glory, ii 23.  
 Morocco, Red, ii 3.  
 Morus, iii 30.  
 Morus nigra, iii 164.  
 Mossy Saxifrages, ii 97.  
 Mother of Thousands, ii 96.  
 Motor versus horse, iv 67.  
 Mottled Umber moth, i 185; iii 77.  
 Mountain Ash, iv 34.  
 Mountain Spinach, iv 196.  
 Mournful Widow, ii 97.  
 Movement of water in plants, i 52.  
 Muehlenbeckia, ii 72.  
 Mulberry, iii 164; iv 30.  
 Mulching, i 123.  
 Mullein, ii 114.  
 Muriate of potash, i 159.  
 Mushroom disease, i 209; iv 123.  
 Mushrooms, iv 117; cost of production, iv 122.  
 Musk, ii 184.  
 Mussel scale, i 174; iii 81.  
 Mustard, iv 195.  
 Mycelium, i 95, 204.  
 Mycorhiza, i 95.  
 Myosotidium, ii 72.  
 Myosotis, ii 43.  
 Myrica asplenifolia, iv 18.



Myristica grandis, iv 65.  
 Myrobalan Plum, iv 34.  
 Myrsiphyllum asparagoides,  
 ii 129.  
 Myrtle, iv 30.  
 Myrtus, iv 30.  
 Mytilaspis pomorum, i 174.  
 Myzus cerasi, i 178.  
 Myzus persicæ, i 186.  
 Myzus ribis, i 181; iii 130.

## N

Nailwort, ii 82.  
 Nandina, iv 31.  
 Narcissus, ii 73.  
 Narcissus fly, i 185.  
 Nasturtium, ii 73; iv 195.  
 Nasturtium officinale, iv 200.  
 Nectarines, iii 131, 138.  
 Nectria cinnabarina, i 206.  
 Nectria ditissima, i 205; iii 88.  
 Nectria Solani, i 210; iv 154.  
 Nemaspora crocea, iii 140.  
 Nematoid worms, i 182.  
 Nematus Ribesi, i 181; iii 146.  
 Nemesia, ii 73.  
 Nemophila, ii 74.  
 Nepenthes, i 49.  
 Nepeta, ii 74.  
 Nephrodium, ii 228; sporangia and indusium of, iii 211.  
 Nephrolepis, ii 228.  
 Nerine, ii 184.  
 Nerium, ii 185.  
 Nertera, ii 74.  
 Neviusia, iv 31.  
 New Zealand Flax, ii 84.  
 New Zealand Spinach, iv 164.  
 Nicotiana, ii 74.  
 Nierembergia, ii 75.  
 Nigella, ii 75.  
 Night soil, i 153.  
 Nitrate of Lime, i 154.  
 Nitrate of Potash, i 155.  
 Nitrate of Soda, i 154.  
 Nitrates, i 154.  
 Nitrification, i 125.  
 Nitrogen and Legumes, i 127.  
 Nitrogen famine, i 127.  
 Nitrogen in the soil, i 128, 142.  
 Nitrogenous Crops, iv 72.  
 Nitrogenous Manures, i 154.  
 Nitrolim, i 156.  
 Nolana, ii 75.  
 Non-returnable baskets, iii 55.  
 Norfolk Island Pine, ii 127.  
 Norway Maple, iv 2.  
 Norway Spruce, iv 62.  
 Nucleus, i 23.  
 Nursery trade, i 5.  
 Nut pests, iii 206.  
 Nut Weevil, i 186; iii 206.  
 Nuts, Hazel, iii 203.  
 Nuttalia, iv 31.

Nycterinia, ii 76.  
 Nymphæa, ii 119.

## O

Oak, iv 35.  
 Oak Fern, ii 231.  
 Ocimum basilicum, iv 186.  
 Ocimum minimum, iv 187.  
 Odontoglossums, ii 189, 190.  
 Oenothera, ii 76.  
 Offset staffs, iii 217.  
 Offsets, propagation by, i 82.  
 Oidium Tuckeri, iii 199.  
 Old Man, ii 9.  
 Old Man's Beard, iv 14.  
 Oleander, ii 185.  
 Olearia, iv 31.  
 Omphalodes, ii 76.  
 Oncidium, ii 190.  
 Oncocylus Irises, ii 61.  
 Onion Fly, i 186; iv 128.  
 Onion Fly, Brassy, i 186.  
 Onion mildew, i 209; iv 126.  
 Onion smut, i 209.  
 Onions, iv 124; ornamental, ii 4.  
 Onosma, ii 76.  
 Onychium, ii 230.  
 Oospora Scabies, i 210; iv 153.  
 Oospores, ii 214.  
 Opadia funebrana, iii 113.  
 Ophiopogon, ii 185.  
 Oplismenus Burmanni, ii 195.  
 Opuntia, ii 141.  
 Orache, iv 196.  
 Orange Ball Tree, iv 9.  
 Orchids, ii 185; hardy, ii 76.  
 Orgyia antiqua, i 193.  
 Origanum heracleoticum, iv 195.  
 Origanum Majorana, iv 195.  
 Origanum Onites, iv 195.  
 Osier, Golden, iv 49.  
 Osmanthus, iv 31.  
 Osmunda, ii 230.  
 Ostrowskya, ii 77.  
 Otiorhynchus picipes, i 189; iii 161.  
 Otiorhynchus sulcatus, i 174.  
 Otiorhynchus tenebricosus, i 189.  
 Ourisia, ii 78.  
 Ovary, i 62.  
 Ovule, i 63.  
 Oxalis, ii 78.  
 Oxalis Acetosella, iv 202.  
 Ox-eye Daisy, Great, ii 22.  
 Oxslip, ii 87.

## P

Packing Fruit, iii 54.  
 Pæonia, ii 78; iv 31.  
 Pæony disease, ii 80.  
 Pæony Tree, iv 31.  
 Palisade cells, i 43.  
 Paliurus, iv 31.

Palms, ii 191.  
 Pampas Grass, ii 51.  
 Pandanus, ii 195.  
 Panicum, ii 195.  
 Pansy, ii 80.  
 Pansy, Tufted, ii 115.  
 Papaver, ii 81.  
 Paper Birch, American, iv 9.  
 Paradise Stock, iii 22.  
 Paraffin emulsion, i 215.  
 Paraffin jelly, i 215.  
 Parasites, i 26.  
 Parasitic fungi, i 203.  
 Parasol Pine, iv 63.  
 Paris Daisy, ii 182.  
 Paris green, i 216.  
 Parlour Palm, ii 130.  
 Parnassia, ii 81.  
 Paronychia, ii 82.  
 Parrot Flower, iv 17.  
 Parrotia, iv 31.  
 Parsley, iv 128.  
 Parsnips, iv 129.  
 Parsnip Fly, i 178.  
 Pasque Flower, ii 7.  
 Passiflora, iv 31.  
 Passion Flower, iv 31.  
 Pastinaca sativum, iv 129.  
 Paulownia, iv 31.  
 Pea Moth, i 186.  
 Pea Tree, Siberian, iv 10.  
 Pea Weevils, i 186.  
 Peach Aphis, i 186.  
 Peach black spot, i 207.  
 Peach brown spot, i 207.  
 Peach die-back, iii 140.  
 Peach, fungoid diseases of, iii 139.  
 Peach leaf-curl disease, i 207; iii 139.  
 Peach mildew, i 207; iii 140.  
 Peach scale, i 186; iii 141.  
 Peaches, iii 131.  
 Peaches and Nectarines under glass, iii 133; in pots, iii 136.  
 Pear-growing at Evesham, iii 30.  
 Pear-growing expenses and receipts, iii 92, 97.  
 Pear-leaf blight, i 207.  
 Pear-leaf Blister Moth, i 186; iii 105.  
 Pear-leaf fungus, i 207.  
 Pear-leaf Mite, i 186; iii 106.  
 Pear Midge, i 186; iii 98, 105.  
 Pear Oyster Scale, i 186.  
 Pear Sawfly, i 189.  
 Pear scab, i 207; iii 107.  
 Pear Sucker, i 189.  
 Pears, iii 91; diseases and pests of, iii 105; imported, iii 91; for market, iii 94, 100; on walls, iii 93; stocks for, iii 95; pruning of, iii 96.  
 Pearl Ash, i 216.  
 Pearl Bush, iv 22.  
 Peas, culinary, iv 130.  
 Peas, Glory, iv 17.

- Peas, Sweet, ii 104.  
 Peaty soil, i 93.  
 Pedlar's Basket, ii 96.  
 Pelargonium, Ivy-leaved, ii 198.  
 Pelargonium, Oak-leaf, ii 199.  
 Pelargonium, Show, ii 198.  
 Pelargonium, Zonal, ii 195.  
 Pellæa, ii 230.  
 Pemphigus lactuarius, i 185.  
 Pencil Cedar, ii 177; iv 61.  
 Penicillium glaucum, i 205.  
 Pennyroyal, ii 71.  
 Pentstemon, ii 82.  
 Penzance Briars, iv 39.  
 Perianth, i 61.  
 Perilla, ii 82.  
 Periploca, iv 32.  
 Periwinkle, iv 56.  
 Pernettia, iv 32.  
 Peronospora effusa, i 210.  
 Peronospora gangliiformis, iv 222.  
 Peronospora infestans, i 210; iv 149.  
 Peronospora Schleideni, i 209.  
 Peronospora viticola, iii 200.  
 Persian Cyclamen, ii 162.  
 Persian insect powder, i 216.  
 Persica vulgaris, iii 131.  
 Pests, greenhouse, i 167; insect, i 166; life-history and habits of, i 170; methods of prevention of, i 171; seeking the cause of, i 170; outdoor, i 169.  
 Petals, i 60.  
 Petroleum insecticide, i 215.  
 Petty Cash Book, iii 240.  
 Petunia, ii 200.  
 Phalænopsis, ii 190.  
 Phaseolus multiflorus, iv 82.  
 Phaseolus vulgaris, iv 84.  
 Philadelphus, iv 32.  
 Phillyrea, iv 33.  
 Phlebodium aureum, ii 231.  
 Phlomis, iv 33.  
 Phlox, ii 83.  
 Phoenix, ii 193.  
 Phoma ampelinum, i 206.  
 Phoma uvicola, iii 201.  
 Phorbia brassicæ, i 177.  
 Phorbia cepetorum, i 186.  
 Phormium, ii 84.  
 Phosphates, i 134, 156.  
 Phosphatic manures, i 156.  
 Phosphoric acid, i 156; in an acre of soil, i 142.  
 Photinia, iv 33.  
 Phygellus, ii 85.  
 Phyllocactus, ii 141.  
 Phylloclades, i 42.  
 Phyllopertha horticola, i 182.  
 Phyllostachys, iv 7.  
 Phyllosticta tabifica, i 209.  
 Phyllotreta nemorum, i 193.  
 Phylloxera, i 193; iii 199.  
 Phymatodes glaucum, ii 231.  
 Physalis, ii 85.  
 Phyteuma, ii 85.  
 Phytomyia nigricornis, i 178.  
 Phytophthora infestans, i 210; iv 150.  
 Phytoptus Pyri, i 186.  
 Phytoptus ribis, i 181; iii 158.  
 Picea, iv 62.  
 Pickling Cabbage, iv 92.  
 Pieris brassicæ, i 177.  
 Pieris floribunda, iv 5.  
 Pieris japonica, iv 5.  
 Pieris rapæ, i 177.  
 Pine, Norfolk Island, ii 127.  
 Pinks, ii 35.  
 Pinus, iv 62.  
 Pionea forficatis, i 182.  
 Piophila apii, iv 101.  
 Pip Fruits, iii 57.  
 Pipe Tree, iv 52.  
 Piping, Hot-water, i 237.  
 Pistil, i 62.  
 Pisum sativum, iv 130.  
 Pitch Pine, iv 62.  
 Pitcher Plants, i 49.  
 Pith, i 37.  
 Pith Moths, iii 79.  
 Pittosporum, iv 33.  
 Placenta, i 63.  
 Plane Tree, iv 33.  
 Plant foods, i 108.  
 Plant foods in an acre of soil, i 110.  
 Plantain Lily, ii 44.  
 Plant-growing, Science of, i 20.  
 Plasmodiophora brassicæ, i 22, 209; iv 182.  
 Plasmopara viticola, i 206; iii 200.  
 Platanus, iv 33.  
 Platycerium, ii 230.  
 Platyparea pœcilopectera, i 174.  
 Platystemon, ii 85.  
 Plough, electric, i 102.  
 Ploughing, i 101; disadvantage of, i 102.  
 Plowrightia morbosa, i 207.  
 Plowrightia ribesiæ, iii 152.  
 Plum Aphis, i 189; iii 114.  
 Plum Aphis, Mealy, iii 114.  
 Plum black knot, i 207.  
 Plum Grub, i 189.  
 Plum leaf blight, i 207.  
 Plum, Myrobalan, iv 34.  
 Plum pockets, i 208.  
 Plum pests and diseases, iii 113.  
 Plum Red Maggot, iii 113.  
 Plum rust, i 208.  
 Plum Sawfly, iii 113.  
 Plum Shot-hole Borer, iii 115.  
 Plum silver-leaf, i 208; iii 115.  
 Plum stocks, iii 110.  
 Plum Weevil, i 189.  
 Plum-growing at Evesham, iii 28.  
 Plums, iii 109; acreage of, iii 109; cost of cultivation, iii 109; flowering, iv 34; varieties to plant, iii 111.  
 Plumbago, ii 201.  
 Plumbago Larpentæ, ii 19.  
 Plume Poppy, ii 12.  
 Plumule, i 36.  
 Plusia gamma, i 190.  
 Plutella cruciferarum, i 181.  
 Plutella maculipennis, i 181.  
 Podocarpus, iv 63.  
 Podophyllum, ii 85.  
 Podosphæra oxyacanthæ, i 205; iii 140.  
 Poet's Narcissus, ii 73.  
 Poinsettia, ii 201.  
 Polemonium, ii 85.  
 Polianthes tuberosa, ii 209.  
 Pollen grains, i 62.  
 Pollen tubes, i 65.  
 Pollination, i 65.  
 Polyantha Rose, iv 39.  
 Polyanthus, ii 85.  
 Polygonatum, ii 86.  
 Polygonatum multiflorum, ii 100.  
 Polygonum, ii 86.  
 Polypodium, ii 231; pinnule and sori, ii 212.  
 Polyporus hispidus, ii 90.  
 Polystichum aculeatum, ii 224.  
 Pome, i 67.  
 Poplar, iv 33.  
 Poppy Anemone, ii 6.  
 Poppy, Californian, ii 41.  
 Poppy, Iceland, ii 81.  
 Poppy, Opium, ii 81.  
 Poppy, Oriental, ii 81.  
 Poppy, Plume, ii 12.  
 Poppy, Shirley, ii 81.  
 Populus, iv 33.  
 Porthesia auriflua, i 194.  
 Porthesia chrysorrhœa, i 177.  
 Portugal Laurel, iv 12.  
 Portulaca, ii 87.  
 Portulaca oleracea, iv 196.  
 Potash, i 135; in soil, i 142; manures, i 158; muriate of, i 159; nitrate of, i 155; soap, i 216; sulphate of, i 159.  
 Potassium carbonate, i 216; sulphide, i 216; iii 51.  
 Potato black scab, i 210; iv 153.  
 Potato canker fungus, i 210.  
 Potato cauliflower disease, i 210.  
 Potato diseases, i 210; iv 149.  
 Potato scab, i 210.  
 Potato-spraying, iv 150.  
 Potato stem rot, i 210.  
 Potato wart disease, i 210; iv 153.  
 Potato winter rot, i 210.  
 Potatoes, iv 131; cost of cultivation, iv 148; cut *v.* whole sets, iv 146; earthing up and sunshine, iv 147; exported from Jersey, iv 134;



leaf-curl of, i 210; iv 152; manures for, iv 136; over-crowding and chats, iv 145; planting, iv 142.  
*Potentilla*, ii 87.  
*Poterium sanguisorba*, iv 187.  
*Poudrette*, i 153.  
*Poultry manure*, i 164.  
*Pretty Betsy*, ii 18.  
 Prevention of insect pests, i 171.  
*Prickly Heath*, iv 32.  
*Prickly Thrift*, ii 2.  
*Primary Root*, i 29.  
*Primrose*, ii 87.  
*Primula*, ii 87.  
*Primula Auricula*, ii 11.  
*Primula*, Chinese, ii 203.  
*Primula obconica*, ii 202.  
*Primula variabilis*, ii 85.  
*Primula vulgaris*, ii 87.  
*Prince Albert's Yew*, iv 63.  
*Prince's Feather*, ii 5.  
*Pritchardia aurea*, ii 195.  
*Pritchardia filifera*, ii 195.  
*Privet*, iv 28.  
 Propagation, methods of, i 71; by leaves, i 58.  
 Protection against frost, iii 53; against rabbits, iii 24.  
*Proteids*, i.  
*Prothallus of Ferns*, ii 213.  
*Protococcus viridis*, i 20.  
*Protoplasm*, i 21.  
*Prumnopitys elegans*, iv 63.  
*Prunella*, ii 89.  
*Pruning Fruit Trees*, iii 23; cherries, iii 124; pears, iii 96.  
*Prunus*, iv 34.  
*Prunus Amygdalus*, iv 5.  
*Prunus insititia*, iii 118.  
*Pseudolarix Kämpferi*, iv 62.  
*Pseudomonas campestris*, i 209.  
*Pseudopeziza ribis*, iii 152.  
*Pseudotsuga*, iv 63.  
*Psylla rosæ*, i 178.  
*Psylla mali*, i 173; iii 83.  
*Psylla pyri*, i 189.  
*Ptelea*, iv 34.  
*Pteris*, ii 231.  
*Pterostichus vulgaris*, iii 170.  
*Ptychoraphis angusta*, ii 195.  
*Ptychosperma Alexandræ*, ii 194.  
*Puccinia asparagi*, i 208.  
*Puccinia malvacearum*, ii 54.  
*Puccinia pruni*, i 208.  
*Puccinia violæ*, ii 118.  
*Pulmonaria*, ii 89.  
*Pulvinaria ribesiæ*, i 181.  
*Pulvinaria vitis*, i 193; iii 199.  
*Purple Rock Cress*, ii 11.  
*Purser case, the*, iii 7.  
*Purslane*, iv 196.  
*Pyracantha*, iv 19.  
*Pyrethrum*, ii 89.  
*Pyrethrum aureum*, ii 91.

*Pyrethrum Powder*, i 216.  
*Pyrethrum uliginosum*, ii 22.  
*Pyrus*, iv 34.  
*Pyrus communis*, iii 91.  
*Pyrus Malus*, iii 57.  
*Pythium debaryanum*, i 28.

## Q

*Quassia solution*, i 216.  
*Quercus*, iv 35.  
*Quick*, iv 19.  
*Quicklime powder*, i 216.  
*Quince*, iii 107.  
*Quince Black-rot*, i 208.  
*Quince*, Japanese, iv 35.  
*Quince stocks*, iii 95.

## R

*Rabbits*, protection against, iii 24.  
*Radicle*, i 31.  
*Radishes*, iv 155.  
*Radishes in French gardens*, iv 224; under glass, iv 158.  
*Rainfall*, i 118; iv 206.  
*Raking soil*, i 106.  
*Raking and harrowing*, i 106.  
*Ramondia*, ii 91.  
*Rampion*, iv 197.  
*Rampion, Horned*, ii 85.  
*Ramularia tulasnei*, iii 172.  
*Ranunculus*, ii 92.  
*Ranunculus, Turkey*, ii 92.  
*Rape*, iv 195.  
*Rape dust manure*, i 153.  
*Raphanus sativus*, iv 155.  
*Raspberries*, iii 159; at Blairgowrie, iii 35; cost of cultivation, iii 36.  
*Raspberry Beetle*, i 189; iii 161.  
*Raspberry cane rust*, i 208.  
*Raspberry Moth*, i 189; iii 162.  
*Raspberry or Clay-coloured Weevil*, i 189; iii 161.  
*Rates and fruit-growing*, iii 7.  
*Receipts from market garden*, iii 232.  
*Receptacle*, i 63.  
*Rectangular measures*, iii 222.  
*Red Cabbage*, iv 92.  
*Redhead*, ii 10.  
*Red-hot Poker Plants*, ii 62.  
*Red-legged Garden Weevil*, i 189.  
*Red Maggot of Plums*, iii 113.  
*Red Spider*, i 189; of Gooseberry, iii 146.  
*Red Valerian*, ii 18.  
*Redwell v. Flint case*, iii 10.  
*Redwood Tree*, iv 64.  
*Reed Mace*, i 35.  
*Rehmannia*, ii 92.

*Remedies for fungoid diseases*, i 205, 212; insect pests, i 173, 212.  
*Rent, rates, and taxes*, iii 6; iv 69.  
*Reproduction, asexual*, i 59; sexual, i 65.  
*Reseda odorata*, ii 71.  
*Respiration of plants*, i 22, 44.  
*Retarding plants*, ii 66.  
*Retinospora*, iv 63.  
*Rhamnus*, iv 36.  
*Rhapis*, ii 194.  
*Rheum*, ii 93.  
*Rheum hybridum*, iv 158.  
*Rhizoglyphus echinopus*, i 177.  
*Rhizoids, Fern*, ii 213.  
*Rhizomes*, i 40.  
*Rhodanthe Manglesi*, ii 42.  
*Rhododendron*, iv 36; greenhouse, ii 204.  
*Rhodora canadensis*, iv 37.  
*Rhodotypos*, iv 37.  
*Rhopalosiphon Dianthi*, i 182.  
*Rhubarb*, iv 158.  
*Rhus*, iv 37.  
*Ribbon Ferns*, ii 231.  
*Ribes Grossularia*, iii 143.  
*Ribes nigrum*, iii 153.  
*Ribes rubrum*, iii 153.  
*Ribes sanguineum*, iv 38.  
*Ricepaper Tree*, iv 5.  
*Richardia æthiopica*, ii 128.  
*Ricinus*, ii 93.  
*Ridging-up soil*, i 106.  
*Ringings stems*, i 79.  
*Riophila apii*, i 178.  
*Roast Beef Plant*, ii 60.  
*Robinia*, iv 38.  
*Rochea*, ii 93, 141.  
*Rock Cress, Purple*, ii 11.  
*Rock garden plants*, ii 93.  
*Rock Rose*, iv 13.  
*Rodgersia*, ii 13.  
*Rods, boning*, iii 217.  
*Rolling soil*, i 106.  
*Romneya*, ii 94.  
*Rooks, value of*, i 172.  
*Root and its work*, i 29.  
*Root Aphis*, i 189.  
*Root fungus*, iii 48.  
*Root Gall*, i 182.  
*Root-grafting*, i 88.  
*Root hairs*, i 30.  
*Root-pressure*, i 52.  
*Root, primary*, i 29.  
*Roots, food absorbed by*, i 33; functions of, i 31, 33; air, water and, i 32; as manure, i 150; contractile, i 34; propagation by, i 58; relation of soil to, i 31; tuberous, i 32.  
*Rootstocks*, i 82.  
*Rose Aphis*, i 190.  
*Rose Acacia*, iv 38.  
*Rosechafer*, i 190.  
*Rosemary*, iv 49.  
*Rose mildew*, iv 48.

Rose Sawfly, i 190.  
 Rose Tortrix, i 190.  
 Rose of Sharon, iv 25.  
 Roses, iv 38; for profit, iv 39;  
   grafting, iv 44; in pots, iv  
   46; propagation of, iv 41.  
 Rosmarinus, iv 49.  
 Rothamsted experiments, i  
   142.  
 Rowan Tree, iv 34.  
 Royal Fern, ii 230.  
 Rubus, iv 49.  
 Rubus Idæus, iii 159.  
 Rubus laciniatus, iii 163.  
 Rubus phoenicolasius, iii 163.  
 Rudbeckia, ii 94.  
 Rue, iv 197.  
 Rumex Acetosa, iv 199.  
 Rumex montanus, iv 199.  
 Rumex scutatus, iv 199.  
 Runner Bean, iv 82.  
 Runners, propagation by, i  
   81.  
 Ruscus, i 41; iv 49.  
 Rush, ii 13.  
 Rust, Chrysanthemum, ii  
   155.  
 Ruta graveolens, iv 197.

## S

Saccharomyces Cerevisiæ,  
   i 21.  
 Sage, iv 197.  
 Sage, Jerusalem, iv 33.  
 Sago Palm, ii 162.  
 Sagina, ii 95.  
 Sagittaria, ii 13.  
 St. Anthony's Nuts, iv 51.  
 St. Bernard's Lily, ii 7.  
 St. Bruno's Lily, ii 7.  
 St. Dabeoc's Heath, iv 19.  
 St. John's Wort, iv 25.  
 St. Patrick's Cabbage, ii 95.  
 Saintpaulia, ii 204.  
 Salads, Small, iv 186.  
 Sales Book, Fruit, iii 235;  
   Vegetable, iii 23-6.  
 Salisburia adiantifolia, iv 61.  
 Salix, iv 49.  
 Salpiglossis, ii 95.  
 Salsafy, iv 198.  
 Salt as manure, i 162.  
 Saltpetre, Chili, i 154.  
 Salvia, ii 205.  
 Salvia officinalis, iv 197.  
 Salvia Sclarea, iv 190.  
 Sambucus, iv 50.  
 Sanchezia, ii 205.  
 Sand, value of, i 92.  
 Sandy Loam, i 92.  
 Sandy Soil, i 91.  
 Sanguinaria, ii 95.  
 Santolina, iv 50.  
 Sanvitalia, ii 95.  
 Sap in winter, i 54.  
 Saponaria, ii 95.  
 Saprophytes, i 26, 203.  
 Saprophytic fungi, i 203.  
 Sarracenia, i 50.  
 Sassafras Tree, iv 27.  
 Satureia hortensis, iv 198.  
 Satureia montana, iv 198.  
 Savin, iv 61.  
 Savory, iv 198.  
 Savoy Cabbage, iv 93.  
 Sawflies, Rose, i 190.  
 Saxegothea, iv 63.  
 Saxifraga, ii 95.  
 Scab of Potatoes, iv 153.  
 Scabiosa, ii 97.  
 Scalding of Grapes, iii 198.  
 Scarborough Lily, ii 210.  
 Scarlet Oak, iv 35.  
 Scarlet Runners, iv 82.  
 Schizanthus, ii 97.  
 Schizocodon, ii 98.  
 Schizoneura fodiens, i 181.  
 Schizoneura lanigera, i 173;  
   iii 81.  
 Schizopetalon, ii 98.  
 Sciadopitys, iv 63.  
 Science of plant growing, i 20.  
 Scilla, ii 98.  
 Scilla festalis, ii 12.  
 Scirpus, ii 13.  
 Sclerotinia fructigena, i 205;  
   iii 86.  
 Sclerotinia fuckeliana, i 206;  
   iii 151, 201.  
 Sclerotinia pæoniæ, ii 80.  
 Scolecotrichum melophthorum,  
   i 207; iv 224.  
 Scolopendrium, ii 232.  
 Scolytus rugulosus, i 182.  
 Scorpion Senna, iv 18.  
 Scorzonera, iv 198.  
 Scotch Rose, iv 39.  
 Scotland, fruit-growing in,  
   iii 33.  
 Scots Fir, iv 62.  
 Screw Pine, ii 195.  
 Sea Buckthorn, iv 24.  
 Seaforthia, ii 194.  
 Sea Holly, ii 40.  
 Sea Kale, iv 160.  
 Sea Lavender, ii 101.  
 Sea Pink, ii 9.  
 Sea Thrift, ii 9.  
 Seaweed manure, i 151.  
 Sedum, ii 98.  
 Seedling Stem, i 35.  
 Seed-sowing, i 74.  
 Seed Trade, the, i 2.  
 Seeds, development of, i 69;  
   germination of, i 69; pro-  
   pagation by, i 71; vitality  
   of, i 73.  
 Selaginella, ii 232.  
 Semasia Woerberana, i 194.  
 Sempervivum, ii 98, 141.  
 Senecio, ii 99.  
 Senna, Bladder, iv 17.  
 Senna, Scorpion, iv 18.  
 Sequoia, iv 64.  
 Seringa, iv 32.  
 Service Tree, iv 35.  
 Sexual Reproduction, i 65.  
 Shallot, iv 162.  
 Shank in Vines, iii 198.  
 Shield Fern, ii 224.  
 Shoddy as manure, i 153.  
 Shooting Stars, ii 37.  
 Shortia, ii 99.  
 Shot-hole borer, iii 115.  
 Shot-hole fungus, i 208.  
 Shrubs, Trees and, iv 1.  
 Siberian Crab, iv 35.  
 Sidalcea, ii 99.  
 Sieve tubes, i 24.  
 Silene, ii 99.  
 Silica, i 97, 109, 111.  
 Silpha opaca, i 174.  
 Silver Almond, iv 5.  
 Silver Ferns, ii 227.  
 Silver Fir, iv 59.  
 Silver-leaf of Plums, i 208; iii  
   115.  
 Silver Tree, Missouri, iv 21.  
 Silver Y Moth, i 190.  
 Sinapis alba, iv 195.  
 Sinningia, ii 172.  
 Siphonophora lutea, i 194.  
 Siphonophora Pelargoni,  
   182.  
 Siphonophora Rosæ, i 190.  
 Sitones crinita, i 186.  
 Sitones lineata, i 186.  
 Skimmia, iv 50.  
 Skip-jacks, iv 179.  
 Sleepy disease of Tomatoes,  
   i 210; iv 180.  
 Sloe, iv 34.  
 Slug-worms, i 190.  
 Slugs, i 190.  
 Slugs, ear-shelled, i 200.  
 Small Ermine Moth, i 190.  
 Small fruits, iii 143.  
 Small salads, iv 186.  
 Smilax, ii 129.  
 Smoke Tree, iv 38.  
 Smudging, iii 52.  
 Snails, i 190.  
 Snake's Tongue Ferns, ii 228.  
 Snapdragon, ii 100.  
 Snowball Tree, iv 55.  
 Snowberry, iv 51.  
 Snowdrop, ii 45.  
 Snowdrop Tree, iv 24.  
 Snowflake, Spring, ii 63.  
 Snowflake, Summer, ii 63.  
 Snowy Fly, i 190.  
 Soapwort, ii 95.  
 Soda, Nitrate of, i 154.  
 Sodium, chloride of, i 162;  
   cyanide, i 216.  
 Soft soap insecticide, i 216.  
 Soil, i 89; absorptive power  
   of, i 117; analysis, i 132;  
   bacteria in, i 125; burning  
   and steaming, i 130; capil-  
   lary power of, i 122; chalky,  
   i 92; classification of, i 91;  
   clayey, i 92; chemical ana-  
   lysis of, i 133; digging, i  
   102; electrifying, i 131;  
   formation of, i 98; for vege-  
   tables, iv 66; handworking  
   the, i 138; humus in, i 94;



- inoculation of, 127; mechanical analysis of, i 96; nitrification in, i 125; plant foods in, i 108; sandy, i 91; science of the, i 89; sterilizing, i 130; temperature of, i 100; time to work, i 107; trenching, i 103; water in, i 98; weight of, i 97.
- Solanaceous crops, iv 72.
- Solanum, ii 205.
- Solanum jasminoides, ii 206.
- Solanum Melongena, ii 206; iv 192.
- Solanum Wendlandi, ii 206.
- Solidago, ii 100.
- Solomon's Seal, ii 100.
- Soot, i 152.
- Sophora, iv 50.
- Sorosis, i 68.
- Sorrel, iv 199.
- Sources of plant food, i 108.
- Southernwood, iv 199.
- Sowbread, ii 26.
- Sowing fiddle, i 75.
- Spade culture, iii 18.
- Spanish Bluebell, ii 12.
- Spanish Broom, iv 50.
- Sparmannia, ii 206.
- Spartium, iv 50.
- Spawning Mushroom Beds, iv 119.
- Spearmint, iv 116, 295.
- Speedwell, ii 114.
- Spergula, ii 95.
- Sphærella fragariæ, i 208; iii 171.
- Sphæroopsis malorum, i 208.
- Sphærotheca Castagnei, i 209.
- Sphærotheca humuli, ii 172.
- Sphærotheca Mali, iii 90.
- Sphærotheca Mors-Uvæ, i 206; iii 147.
- Sphærotheca pannosa, i 207.
- Sphenogyne speciosa, ii 114.
- Spiders, i 201.
- Spiderwort, ii 110.
- Spigelia, ii 101.
- Spinach, iv 163.
- Spinach Anthracnose, i 163.
- Spinach in French gardens, iv 225.
- Spinach mildew, i 210.
- Spinach, New Zealand, iv 164.
- Spinach white smut, i 210.
- Spinacia oleracea, iv 163.
- Spindle Tree, iv 22.
- Spiræa, herbaceous, ii 101.
- Spiræa japonica, ii 206.
- Spiræa, shrubby, iv 50.
- Spittle fly, i 190.
- Sporangium of Ferns, ii 211.
- Spores, Fern, ii 211.
- Sporidesmium putrefaciens, i 209.
- Spraying fruit-trees, iii 49.
- Spraying, winter, iii 51.
- Spring Onions, iv 127.
- Sprouting Broccoli, iv 87; potatoes, iv 139.
- Sprouts, Brussels, iv 88.
- Spruce Firs, iv 62.
- Spurge, Caper, ii 41.
- Spurge, Cypress, ii 41.
- Spurge Laurel, iv 20.
- Square Measure, iii 214, 220.
- Squill, ii 98.
- Stachys lanata, ii 101.
- Stachys tuberifera, iv 74.
- Stag's Horn Fern, ii 230.
- Stag's Horn Sumach, iv 38.
- Stamens, i 61.
- Stapelia, ii 141.
- Staphylea, iv 51.
- Starch in leaves, i 44.
- Starlings, i 172.
- Star Tulip, ii 15.
- Starwort, ii 10.
- Statice, ii 101.
- Steaming the soil, i 130.
- Stellaria, ii 102.
- Stem cuttings, i 78.
- Stem, functions of the, i 35; growth and thickening of, i 36; seedling, i 35; dicotyledonous, i 38; monocotyledonous, i 38; monopodial and sympodial, i 55.
- Stenactis speciosus, ii 39.
- Stephanotis, ii 207.
- Stereum purpureum, i 208; iii 115, 117.
- Sterilizing soil, i 130.
- Stigma, i 62.
- Stock, Brompton, ii 103.
- Stock, East Lothian, ii 103.
- Stock, Intermediate, ii 103.
- Stock, Queen, ii 103.
- Stock, Ten-week, ii 102.
- Stocks, Cherry, iii 120.
- Stocks, Crab, iii 21.
- Stocks, Doucin, iii 22.
- Stocks, Free, iii 22.
- Stocks, Mahaleb, iii 120.
- Stocks, Paradise, iii 22.
- Stocks, Pear, iii 95.
- Stocks, Plum, iii 110.
- Stocks, Quince, iii 95.
- Stokesia, ii 103.
- Stomata, ii 103.
- Stoncrop, ii 98.
- Stone Fruits, iii 109.
- Stone Pine, Swiss, iv 62.
- Storing fruit, iii 64.
- Stove plants, ii 122.
- Strawberries, iii 164; analysis of, 166; cost of cultivation, iii 166; forcing, iii 166.
- Strawberry Eelworms, iii 171.
- Strawberry Ground-Beetles, iii 170.
- Strawberry-growing at Evesham, iii 30.
- Strawberry-leaf blight, i 208.
- Strawberry-leaf spot, iii 171.
- Strawberry mildew, iii 172.
- Strawberry Tree, iv 6, 18.
- Streptocarpus, ii 208.
- Streptosolen, ii 208.
- Strobilanthes, ii 208.
- Structure of higher plants, i 22.
- Structures, greenhouse, i 218.
- Style, i 62.
- Subsoil, analysis of, i 111.
- Suckers, propagation by, i 81.
- Sulphate of ammonia, i 155; of Copper Solution, i 151; of Copper and Lime, iv 152; of potash, i 159.
- Sulphide of Potassium, i 216; iii 51.
- Sumach, iv 37.
- Sun Beetles, i 198.
- Sundew plant, i 28.
- Sunflower, annual, ii 103; perennial, ii 51.
- Sunlight, value of, i 44; iv 147.
- Sun Plant, ii 87.
- Sun Rose, iv 24.
- Sunshine records, iv 208.
- Superphosphates, i 156.
- Surveying garden, iii 213.
- Swainsona, ii 209.
- Sweet Almond, iv 5.
- Sweet Alyssum, ii 4.
- Sweet Amber, iv 25.
- Sweet Bay-tree, iv 27.
- Sweet Briar, iv 39.
- Sweet Fern, iv 18.
- Sweet Gum Tree, iv 29.
- Sweet Herbs, iv 186.
- Sweet Pea, ii 104.
- Sweet Scabious, ii 97.
- Sweet Sultan, ii 108.
- Sweet William, ii 108.
- Sweet Woodruff, ii 10.
- Swift Moth, iii 170.
- Sycamore, iv 2.
- Symbiosis, i 27.
- Symphoricarpus, iv 51.
- Sympodial inflorescence, i 57.
- Sympodial stems, i 56.
- Synchitrium endobioticum, iv 153.
- Syringa, iv 52.

## T

- Tables, land measure, iii 214, 221.
- Tagetes, ii 70.
- Tamarisk, iv 53.
- Tamarix, iv 53.
- Tanacetum vulgare, iv 199.
- Tanks and wells, iii 226, 227.
- Tansy, iv 199.
- Taproots, i 31.
- Taraxacum Dens-Leonis, iv 191.
- Tarragon, iv 200.
- Taxads, iv 59.
- Taxodium sempervirens, iv 64.
- Taxus, iv 64.

Tea Plant, New Jersey, iv 11.  
 Tecoma, ii 209; iv 53.  
 Telegraph Plant, ii 166.  
 Temperature, Air, i 100; soil, i 100; for seed germination, i 69.  
 Tenby Daffodil, ii 27.  
 Tephritis Onopordinis, i 178; iv 100.  
 Testa of seed, i 68.  
 Testacella halotidea, i 201.  
 Tetragona expansa, iv 164.  
 Tetranychus telarius, i 189.  
 Teucrium, ii 149.  
 Thalictrum, ii 109.  
 Thinning Grapes, iii 190.  
 Thistle, Fish-bone, ii 23.  
 Thorn, Cockspur, iv 19.  
 Thorn, Fire, iv 19.  
 Thorn, Glastonbury, iv 19.  
 Thorns (Quick), iv 19.  
 Thrift, Prickly, ii 2.  
 Thrift, Sea, ii 9.  
 Thrinax, ii 195.  
 Thrips, i 190.  
 Thrushes, i 172.  
 Thuja, iv 64.  
 Thujopsis dolabrata, iv 65.  
 Thunbergia, ii 109.  
 Thunia, cuttings of, i 78.  
 Thyme, iv 200.  
 Thymus, ii 109; iv 200.  
 Tiarella, ii 109.  
 Tiger Beetle, i 198.  
 Tiger Flower, ii 109.  
 Tiger Lily, ii 64.  
 Tiger Tail Spruce, iv 62.  
 Tigridia, ii 109.  
 Tilia, iv 53.  
 Tillage, deep, i 104, 115; ii 70.  
 Time Book, iii 237.  
 Tinea capitella, i 181.  
 Tipula oleracea, i 181.  
 Tipula paludosa, i 181.  
 Tissues, plant, i 25; laticiferous, i 25.  
 Toadflax, ii 66.  
 Toad Lily, ii 110.  
 Toads, i 199.  
 Tobacco, ii 74.  
 Tobacco wash and powder, i 217.  
 Todea, ii 235.  
 Tolmiea Menziesi, i 59.  
 Tomatoes, iv 164; bacterial disease of, i 210; iv 181; defoliating, iv 171; diseases of, i 210; iv 178; importations of, iv 165; in Channel Islands, iv 166; manuring, iv 173; outdoor, iv 175; seed-saving, iv 177; winter crops, iv 174.  
 Tomatoes, black blotch, iv 181.  
 Tomatoes, sleepy disease of, i 210; iv 180.  
 Torreya, iv 65.

Tracheids, i 24.  
 Trachelium, ii 209.  
 Trachycarpus excelsa, ii 194.  
 Tradescantia, ii 110.  
 Tradescantia zebrina, ii 209.  
 Train-oil soap, i 216.  
 Trama troglodytes, i 189.  
 Tragopogon porrifolius, iv 198.  
 Transpiration, i 44; water of, i 52.  
 Transport of food materials, i 53.  
 Trapa natans, i 35.  
 Traveller's Joy, iv 14.  
 Trays, storing, iii 66.  
 Tree and shrub trade, i 11.  
 Tree of Heaven, iv 4.  
 Tree Pæony, iv 31.  
 Trees and shrubs, iv 1.  
 Trembling Fern, ii 232.  
 Trenching, i 103; bastard, iii 18.  
 Trichomanes radicans, ii 235.  
 Tricyrtis, ii 110.  
 Trillium, ii 110.  
 Triphæna pronuba, i 194.  
 Tritoma, ii 61.  
 Tritonia, ii 110.  
 Trochilium myopæforme, i 174.  
 Trochilium tipuliforme, i 181.  
 Trollius, ii 111.  
 Tropæolum, ii 111.  
 Tropæolum majus, iv 195.  
 Tsuga, iv 65.  
 Tuberoze, ii 209.  
 Tubers, i 40.  
 Tubular boilers, i 232.  
 Tufted Pansy, ii 115.  
 Tulips, ii 112.  
 Tulip Tree, iv 29.  
 Turkey Oak, iv 35.  
 Turk's Cap Lily, ii 63.  
 Turnip Fly, i 193; iv 184.  
 Turnip Gall Weevil, i 193.  
 Turnip Mud Beetle, i 193.  
 Turnip Sawfly, i 193.  
 Turnips, iv 181; in French gardens, iv 225.  
 Tutsan, iv 25.  
 Tylenchus devastatrix, i 182; iii 171.

## U

Ulex, iv 54.  
 Ulmus, iv 54.  
 Umbelliferous crops, iv 72.  
 Umbrella Pine, iv 63.  
 Uncinula spiralis, i 207; iii 199.  
 Urine, i 146.  
 Urocystis cepulæ, i 209.  
 Uromyces Phaseoli, i 208.  
 Ursinea, ii 114.  
 Usambara Violet, ii 205.

## V

V-Moth, i 193.  
 Vaccinium, iv 54.  
 Valerian, Red, ii 18.  
 Valerianella olitoria, iv 190.  
 Vallota, ii 210.  
 Van Helmont's experiment, i 108.  
 Vaporizing, i 168.  
 Vapourer Moth, i 193.  
 Vascular system, i 25, 37.  
 Vegetable Marrow, iv 184.  
 Vegetable Oyster, iv 198.  
 Vegetables, ash analyses of, i 109; for market, iv 66; fungoid diseases of, i 208; natural groups of, iv 72.  
 Vegetation, influence on soil, i 101.  
 Venidium, ii 114.  
 Ventilators of greenhouses, i 229.  
 Venturia inæqualis, iii 85.  
 Venturia pirina, iii 107.  
 Venus' Fly Trap, ii 149.  
 Veratrum, ii 114.  
 Verbascum, ii 114.  
 Verbena, ii 210.  
 Verbena, Lemon-scented, ii 125.  
 Veronica, ii 114; iv 54.  
 Verschaffeltia splendida, ii 195.  
 Vesca vulgaris, iv 11.  
 Vessels in plants, i 24.  
 Viburnum, iv 55.  
 Vicia Faba, iv 81.  
 Vinca, iv 56.  
 Vine black rot, iii 201.  
 Vine borders, making, iii 182.  
 Vine, brown mildew of, iii 201.  
 Vine Crown Gall, iii 202.  
 Vine, Grape, iii 179.  
 Vine Louse, i 193.  
 Vine manures, iii 187.  
 Vine mildew, iii 200.  
 Vine powdery mildew, iii 199.  
 Vine, Red Spider on, iii 197.  
 Vine scale, i 193; iii 199.  
 Vine shanking, iii 198.  
 Vine Weevil, i 174; iii 197.  
 Vineries, cost of, iii 181; heating of, iii 181.  
 Vines, propagation of, iii 195.  
 Viola, ii 115.  
 Violet, Usambara, ii 205.  
 Violet Ground Beetle, i 198.  
 Violets, ii 116.  
 Virgil and green manures, i 149.  
 Virgilia lutea, iv 13.  
 Virginian Creeper, iv 57.  
 Viscum, iv 56.  
 Vitality of seeds, i 73.  
 Vitex, iv 56.  
 Vitis, iv 56.  
 Volumes, iii 225.



## W

Wages Book, iii 237.  
 Wahlenbergia, ii 118.  
 Waitzia, ii 118.  
 Walking Fern, ii 232.  
 Wallflowers, ii 118.  
 Wallichia, ii 195.  
 Walls, Pears on, iii 93.  
 Walnut, iii 206; iv 27.  
 Walnut-leaf blotch, iii 208.  
 Walnut-leaf spot, iv 208.  
 Wandering Jew, ii 96.  
 Warty disease of Potatoes, iv 153.  
 Washing soda solution, iv 151.  
 Washingtonia filifera, ii 195.  
 Wasps, i 193.  
 Waste land afforestation, i 12.  
 Wasting ground, iv 148.  
 Water, how lost, i 117; in plants, i 52; in the soil, i 116; lost through leaves, i 118; lost by weeds, i 121; plants, i 54; amount of transpired, i 120.  
 Water tanks in greenhouses, i 228.  
 Watercress, iv 200.  
 Water Lilies, ii 119.  
 Wayfaring Tree, iv 55.  
 Weasel, i 201.  
 Weeds, water lost by, i 121.  
 Weigela, iv 20.  
 Wellingtonia gigantea, iv 64.  
 Welsh Poppy, ii 71.  
 Weymouth Pine, iv 62.  
 Whale-oil soap, i 216.  
 Wheat experiments, i 113.  
 Wheat plant, composition of, i 141.

Whin, iv 54.  
 Whip-grafting, i 85.  
 White Arabis, ii 8.  
 White Hellebore, ii 114.  
 Whitewood, iv 54.  
 Wigandia, ii 210.  
 Wig Tree, iv 38.  
 Willow, iv 49; Van Helmont's experiment with, i 108.  
 Willowherb, ii 38.  
 Wind, action of, i 100.  
 Wineberry, Japanese, iii 163; iv 49.  
 Winter Aconite, ii 39.  
 Winter Hawthorn, ii 7.  
 Winter Moth, i 193; iii 76.  
 Winter Moth, Great, i 185.  
 Winter rot of Potatoes, iv 154.  
 Winter spraying, iii 51.  
 Winter Sweet, iv 10.  
 Winter wash, i 217.  
 Wireworms, i 193; iv 179.  
 Wistaria, iv 57.  
 Witch Hazel, iv 24.  
 Withy, iv 49.  
 Witloof, iv 189.  
 Woburn wash, i 217.  
 Woerberian Tortrix, i 194.  
 Wolf Berry, iv 51.  
 Wolffia arrhiza, i 22.  
 Wonderberry, American, ii 206.  
 Wood ashes, i 164.  
 Wood fibres, i 25.  
 Wood Laurel, iv 20.  
 Wood Leopard Moth, i 194.  
 Wood Lice, i 194.  
 Wood Lily, ii 110.  
 Woodruff, Sweet, ii 10.  
 Woodsia, ii 234.  
 Wood Sorrel, iv 202.  
 Woodwardia, ii 234.  
 Woody climbers, iv 1.  
 Woody cuttings, i 76.

Woollen refuse, i 153.  
 Woolly Aphis, i 194; iii 81.  
 Worcestershire, fruit-growing in, iii 27.  
 Worms, i 101.  
 Wormwood, ii 9; iv 202.  
 Wreaths, etc., i 9.

## X

Xanthoceras, iv 58.  
 Xeranthemum annuum, i 42.  
 Xyleborus dispar, iii 115.

## Y

Yeast plant, i 21.  
 Yellow Aphis, i 194.  
 Yellow spot of Tomatoes, iv 180.  
 Yellow-tail Moth, i 194.  
 Yellow - underwing Moth, i 194.  
 Yew, iv 64.  
 Yew, Prince Albert's, iv 63.  
 Young fruit-tree fungus, 208.  
 Yucca, iv 58.  
 Yulan, iv 30.

## Z

Zaluzianskia, ii 76.  
 Zauschneria, ii 120.  
 Zea Mays, ii 120; iv 110.  
 Zebrina pendula, ii 209.  
 Zenobia speciosa, iv 5.  
 Zephyranthes, ii 121.  
 Zeuzera Æsculi, i 194.  
 Zinnia, ii 121.  
 Zonal Pelargonium, ii 195.





iv. 58.





# KEY TO THE MODEL OF A CABBAGE

---

## SECTION I.—CABBAGE HEAD IN NATURAL SIZE

- |                        |                  |
|------------------------|------------------|
| 1. Taproot.            | 3. Stock.        |
| 2. Branch Roots.       | 4. Outer Leaves. |
| 5. Leaves of the Head. |                  |

## SECTION II.—A LEAF OF THE HEAD

- |                      |               |
|----------------------|---------------|
| 1. Ribs of the Leaf. | 2. Nervation. |
| 3. Leaf Surface.     |               |

## SECTION III.—EPIDERMIS OF THE LEAF

1. Cellular Tissue greatly enlarged.

## SECTION IV.—MEDIAN LONGITUDINAL SECTION OF THE LEAF

- |  |                        |
|--|------------------------|
| 1. Palisade Cells with Chlorophyll Granules. | 3. Bundle of Raphides. |
| 2. Crystals of Calcium Oxalate.              | 4. Single Crystal.     |
| 5. Leaf Vein, with Sieve Tubes.              |                        |

## SECTION V.

- |                       |                          |
|-----------------------|--------------------------|
| 1. Spongy Parenchyma. | 2. Intercellular Spaces. |
|-----------------------|--------------------------|

## SECTION VI.—UNDER SIDE OF LEAF

- |                            |             |
|----------------------------|-------------|
| 1. Guard Cells of Stomata. | 2. Stomata. |
|----------------------------|-------------|

## SECTION VII.—SIDE SECTION OF THE HEAD

## SECTIONS VIII and VIII $\alpha$ .—LONGITUDINAL SECTION OF THE HEAD

- |                          |                        |
|--------------------------|------------------------|
| 1. Stock.                | 3. Rind.               |
| 2. Threads of Cellulose. | 4. Ribs of the Leaves. |
| 5. Heart.                |                        |

## SECTION IX.—FLOWER

- |                  |                         |
|------------------|-------------------------|
| 1. Flower-stalk. | 6. Ovules.              |
| 2. Sepals.       | 7. Section of the Ovary |
| 3. Petals.       | 8. Style.               |
| 4. Ovary.        | 9. Long Stamens.        |
| 5. Stigma.       | 10. Short Stamens.      |

## SECTION X.—FRUIT

- |                           |                      |
|---------------------------|----------------------|
| 1. Pod Case (outer side). | 4. Seeds.            |
| 2. The Same (inner side). | 5. Stalk.            |
| 3. Middle Wall.           | 6. Remains of Style. |



IX

X

















